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The AUTOMOBILE

What To Wear in the Car

This Year's Fashion Offerings Now Ready for the Spring Tourist—More Stylish Lines Introduced

ONE of the really important essentials of enjoyable automobile touring is proper clothing to meet all weather contingencies. This seems too obvious to be overlooked; yet such is often the case and as many must be planning at the present time to answer the call of spring and the open road it is an opportune moment to consider what the automobile supply stores are displaying.

A review of this year's wear for both sexes brings out some interesting changes over the motor garments of last year. These changes are most marked, as could only be expected, in the offerings for the comfort and delight of the fair sex. It is true that the coverings for the male of the species have also undergone a few apparent alterations to bring them up to date, but these are slight and are in the direction of making the garments externally more like those worn by the man in the street.

Motor Clothing Features

This indeed has been the general tendency since the inception of the self-propelled vehicle. In the early days, for some reason not easily explained, apparel for the automobilist seemed not so much designed to meet his—or her—actual requirements, as to hall-mark the proud possessor of a mechanical wonder as a superior person. Since then experience has proved exactly what is required, in the way of differences from ordinary wear and these special features are noticeable throughout the spring apparel for 1914.

Fig. 1—The latest thing in women's wear for the automobile is the cape. This useful garment is being offered at the up-to-date supply stores in several materials, the most popular being wool velour. A striking example shown in the illustration is a harmonious combination of gabardine in a single shade for the cape proper with a brightly striped inserted vest of silk. The collar is made to sag behind in the manner of a monk's collar for novelty of effect

Loose Sleeve Necessary

First of these motoring requirements is roominess about the shoulders of overcoats. Any tightness at the sleeve joint will contribute to the fatigue of the wearer in the continued sitting posture when touring, and this applies with especial force to the driver, whose arms are more or less extended all the time. The popularity of the raglan sleeve, the balmacaan cut and, in ladies' garments, the kimono sleeve, is directly attributable to this desire for ease and comfort.

In the same way time has shown the necessity of ample width in the skirt of the coat so as to combine protection when seated with looseness of fit. Then there is the fitting of the collar, which should be such that it can be closed up snugly to the neck to resist the cold wind and prevent the entry of dust and at the same time be capable of full opening for the sultry day. Granted these requirements are met the only changes observable are those which belong to Fashion's subtle idiosyncrasies.

The latest material for the

Fig. 2.—A handsome motoring coat for the smart woman. This model is in cut velour black and white check with white broadcloth cuffs and collar. It is made distinctive by the use of a broad belt and the oblique cut of the full skirt. Saks & Co. $68.

Fig. 3.—A straw hat trimmed with bright ratine that is capable of withstanding hard usage and exposure to the weather and yet preserve its fresh appearance. It is a comfortable, flexible head covering. Saks & Co. $3.

Fig. 4.—Silk and straw combination bonnet for wear with the more dressy garments. A new feature is that the veil is attached with three easily opened clips. Opening the center one of these releases the veil for use. Saks & Co. $4 to $6.

coats of both sexes is a knitted fabric. This has the advantage of being warm and light. It can also claim a quality that will appeal to all motorists of withstanding much rough usage, tight folding and stowing into trunks without losing its shape and showing wrinkles. It is of good appearance and is scarcely distinguishable at first glance from the ordinary cloths.

The latest garment, the real feature of interest to the motoring woman this year is the introduction of the cape, one of the few articles of wear with intrinsic beauty. This garment, as adapted to touring needs, is provided with an inserted vest, as shown in Fig. 1—which permits the introduction of a welcome splash of contrasting color, holds the cape in place and affords protection where it is most needed. For weather that though chilly does not demand an overcoat such a garment is ideal. In the example illustrated it will be noticed that the material of the vest, which is of silk, is carried out in the collar. Behind, the collar is given a slight sag in the manner of a monk's collar.

Color Tendencies Are Quieter

Color tendencies show that cloth mixtures are not in such demand this year as flat, quiet colors. But this is offset by the use of more striking contrasts in the way of trimmings on lapel, sleeve and belt. Dustcoats have remained practically as offered last year, mohairs and pongees being the popular materials for these indispensable adjuncts to spring and summer traveling. They are supplied with plain or raglan sleeves and generally with convertible collars, that is, collars in which the lapels can be folded over close to the neck or left open in the usual way, the appearance being correct in either position. Waterproofs are also practically unaltered, last year's models having been found satisfactory.

A novel coat with graceful lines is that shown in Fig. 2, which is a cut velour check with white broadcloth cuffs and collar. It is lined with silk. The skirt fullness, the wide buttoned belt and the fashionable oblique cut of the lower edge are its predominating characteristics. On similar general lines is the most interesting garment, Fig. 7, which can be worn as shown or with the front entirely closed. When open the effect is pleasing, displaying some of the dress.

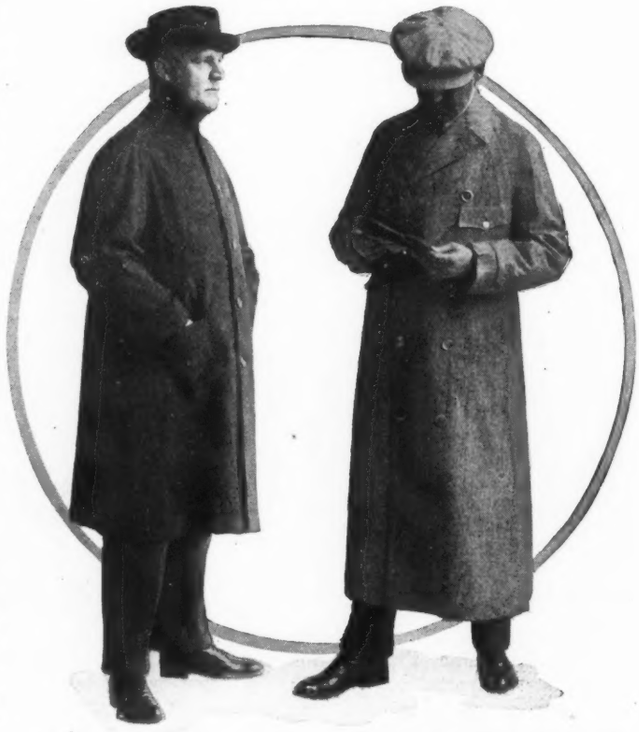


Fig. 5.—Light summer coat from London, showerproofed and having the advantage that in appearance it is not distinct from non-motoring wear. The collar fits snugly and the raglan sleeves afford ease. Saks & Co. $27.50 and $35.

Fig. 6.—Full length mohair dusters are popular in both single and double-breasted models and raglan or plain type sleeves. The model shown is in mercerized cloth and has a belted back, wrist straps, and breast pocket. Saks & Co. $13.50

Fig. 7.—A novel cape-like coat in Vicuna with an attached vest of the same material. It is cut full in the skirt and has the stylish oblique lower edge. Arranged for wear as shown or with the front closed over the vest it is equally attractive. McCreery & Co. $69.50.

Fig. 8.—A full-length loose homespun with close fitting neck and especially deep sleeves. The value of looseness is particularly noticeable in a garment of medium weight enabling it to be worn with the same ease as one of lighter material. Saks & Co. $25 to $35.

The shoulders are of the yoke pattern. It is a lined coat and so is sufficient protection when closed for a slightly chilly day.

Full protection combined with a comfortable roominess of fit is insured by the full length overcoat, Fig. 8. Its general looseness is its principal feature. The sleeves are particularly wide. This garment is supplied in English homespuns and mixtures of a great variety of shades.

The medium length sport coat, Fig. 12 will undoubtedly make a strong appeal. The material is a chinchilla check and is of such weight that no lining is needed. It is available in various colors, black and white being the most popular. The sleeves are of the kimono type.

A light duster is one of the indispensables. That shown in Fig. 21 is a typical example of what is found most useful. It is a full length pongee dustcoat with slot pockets and is relieved from plainness by the button-trimmed cuffs. A light rubberized coat is another almost necessary part of a motoring wardrobe. These are offered this year in as many styles as previously but as there is little to note in the way of change no examples have been illustrated.

Latest Hat Has Detachable Veil

In headwear for ladies a useful novelty is the bonnet and veil combination, Fig. 4. The bonnet itself is silk and straw of contrasting or the same colors. The veil is attached by three clips. When not in use it is held in these and appears only as trimming. By opening the center one the veil can be dropped into position over the face. The fact that this can be done so easily even while riding is a most commendable feature.

For face protection the mica mask is still used to some extent but there is a noticeable desire on the part of the woman motorist to relinquish all face protectors except the veil.

Veils are now obtainable that are practically dustproof without being unduly heavy or lacking in transparency. Colored veils are in demand. Full length (2½ yards) marquisette silk veils that are washable are supplied at $5. The bonnet shown in Fig. 12 is in silk with the veil permanently attached.

In men's wear the most notable development is modeling

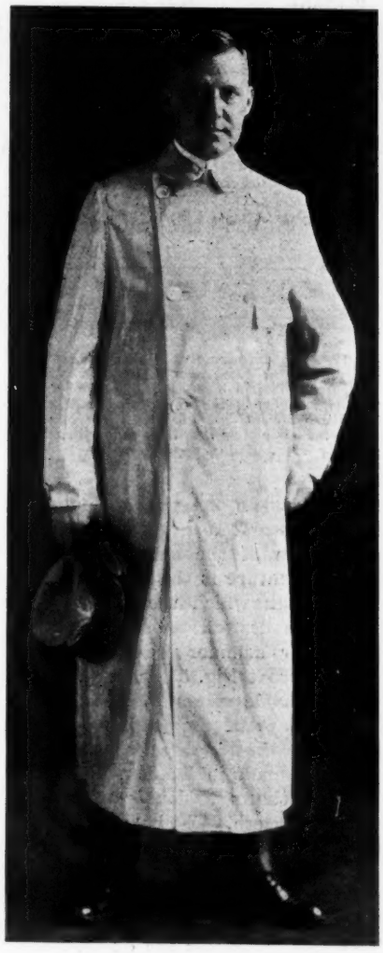


Fig. 11.—Handsome summer outfit consisting of pongee silk full length duster and feather weight silk hat to match. The sleeves are of the coat type with wrist bands. Auto Supply Co. Coat, $25; hat, $2.

Fig. 9.—New spectacle goggle designed to protect driver from glare of approaching headlights. By tilting head slightly forward the vision is through the amber-colored upper portions of the lenses. Auto Supply Co. $2, $3 and $4.

Fig. 10.—The large circular lens spectacle continues to be a favorite eye protection for the driver. These are supplied with white, smoked or amber glass in tortoise shell rims. Auto Supply Co. $1 to $2.50.

NOT many things are of more importance to the motorist who means to obtain the maximum of enjoyment from his or her spring and summer touring than the proper equipment of wearing apparel. Now is the time to look carefully over your motor wardrobe and supply any deficiencies. This year's spring wear is already on the supply store counters and these pages give some

Fig. 12.—An exceedingly smart chinchilla sport coat supplied in black and white check as shown or in colors. It is a medium length garment and is fitted with the kimono type of sleeve. Though unlined the material is such that the shape is well held, at the same time it is light and affords warmth for chilly days. Auto Supply Co. $25

Fig. 13.—Chauffeur's Norfolk suit in whipcord. The example shown is typical of the satisfactory wear for the chauffeur. The material is shower proof. Auto Supply Co. $30.

Fig. 14.—Smart shower proof chauffeur's overcoat. In whipcord this garment affords ample protection for summer showers or chilly evenings. Auto Supply Co. $40.

Fig. 15.—Medium length summer coat in knitted cloth, the latest material for automobile wear. It is extremely light and holds its shape well. McCreery & Co. $22.50.

of overcoats on the popular balmacaan lines. In Figs. 18 and 19 a good-looking cravenetted modification of the balmacaan is illustrated. A handy feature is the provision of straps inside through which the arms can be passed when it is desired to use the garment as a cape. For summer wear the light showerproof overcoat Fig. 5 is useful. It is scarcely distinguishable from ordinary wear. The shoulders are of the raglan cut and the collar can be buttoned up closely to the neck. These are made in London.

Fig. 6 shows a double-breasted duster in mercerized cloth. The back is belted. Another duster with a high fitting collar is shown in Fig. 11. This is a really handsome garment in pongee silk and looks well when worn with the featherweight soft hat of the same material which completes the outfit.

Check caps, especially for the driver, still maintain a favorite place, but the knockabout hat is also in great demand. A distinct novelty in headwear is the Holtite cap shown in Fig.

Fig. 16.—Large tortoise shell spectacle goggles with side cups. The lenses are slightly convex affording a wide view range. The cups at the side are in shell also and afford protection from side gusts. $3.50.

Fig. 17.—Gauntlet driving gloves in kassan with strap wrist fastening. The cuffs are of ample size and are maintained in shape by the use of whalebone stiffeners, while the hand portion is flexible. $5.

indication of what is latest and best. Scarcely any alteration is noticeable in dusters, but in coats there is much of interest. More stylish lines have been introduced than in former years, and many of the garments, for the woman motorist in particular, possess a striking and distinctive appearance in addition to meeting the requirements of ease and comfort demanded of them.

Fig. 18.—Showerproof tweed overcoat with convertible collar. The cut is of the modified balmacaan type with easy fitting sleeves. Auto Supply Co. $25. The example illustrated is a fine black and white check.

Fig. 19.—The garment shown in the previous illustration in use as a cape for which purpose it is provided with straps inside through which the arms can be slipped to hold it in place on the shoulders, the sleeves being allow to hang

Fig. 20.—An imported camel's hair cloth coat that is light ana warm. The sleeve is inset at the shoulder and the back is provided with an inverted pleat to provide the desired looseness and easy comfort. McCreery & Co. $25.

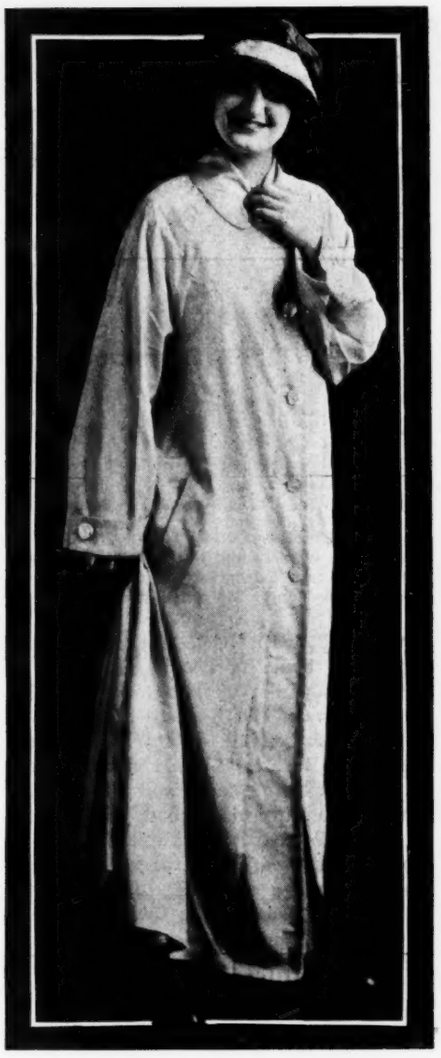


Fig. 21.—Full length pongee duster of the type that is popular with women motorists. The sleeves are of the kimono pattern and the collar is fitted high. McCreery & Co. $19.50.

Fig. 22.—Two types of summer driving gloves, the upper having the palms and fingers corded for wear resisting and the lower fitted with extra strips for the same purpose. Respectively, $2.50 and $3. Above, wind defying driving cap that is extensive as shown, being drawn together by an elastic insertion. Auto Supply Co. $1.50 to $2.50.

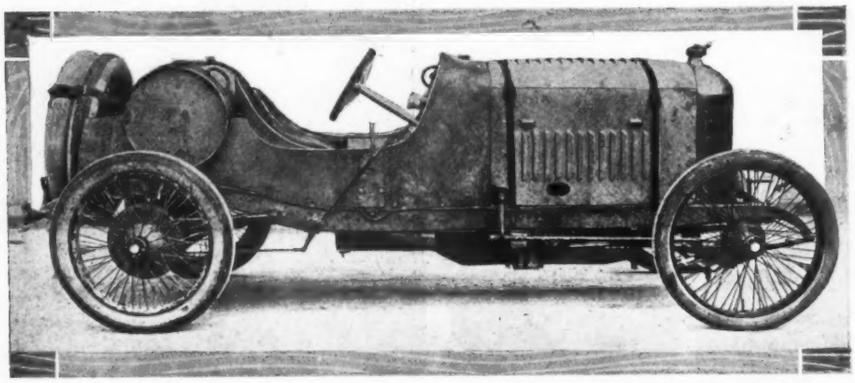
22, in which the front and rear portions are connected by elastic insertions. The material is cut so as not to interfere with this extensible feature and it is claimed that this cap will defy any wind.

For eye protection the large tortoise shell spectacle goggle is proving its usefulness by a large demand. It is light, not unbecoming and allows a wide view range. Something entirely new in eye protectors is the "E. A. P." spectacle goggle Fig. 9 produced by the Auto Supply Co. This is designed to obviate the dangerous glare of approaching head lights. By tilting his head slightly forward the driver brings the line of sight, which ordinarily is through the plain glass into the amber-colored upper portion.

In gloves for driving it is usual to reinforce the palm and the inside of the fingers to withstand the hard wear on the steering wheel. Two examples are shown at the left. In the upper one the reinforcement consists of cording. The other has extra strips sewn on.

Photographs are by N. Lazarnick, New York.

Secrets of Delage Racers Revealed



Side view of one of the four-cylinder Delage racers which is to appear at the 500-mile race to be held on the Indianapolis Speedway May 30. The Delage cars to be seen in this race hold both Europe's long distance road records, having made an average of 76.8 miles an hour for nearly 350 miles, and a lap average of 82.5 miles an hour

Four-Cylinder Block Motor with Four Valves in Each Cylinder Head—Ball Bearings Throughout—Hollow Crankshaft and Connecting-Rods

PARIS, FRANCE, April 7—An average of 76.8 miles an hour for nearly 350 miles, and a lap average of 82.5 miles an hour constitute Europe's long distance road records. Both records are held by the Grand Prix Delage cars coming to America for the Indianapolis 500-mile race, and were established in the Grand Prix de France last August, when Delage won first, second, and fifth places. In addition to this record, the Delage machines have another claim to attention: they have never failed to finish their races, and they have gone through all their speed contests without a tool being touched or the bonnet being lifted. Three cars were built; two were entered for the French Grand Prix and both went through without a tool being laid on them. The whole three went into the Grand Prix de France and again covered the full distance without the bonnet being lifted. This latter race was the fastest ever run in Europe.

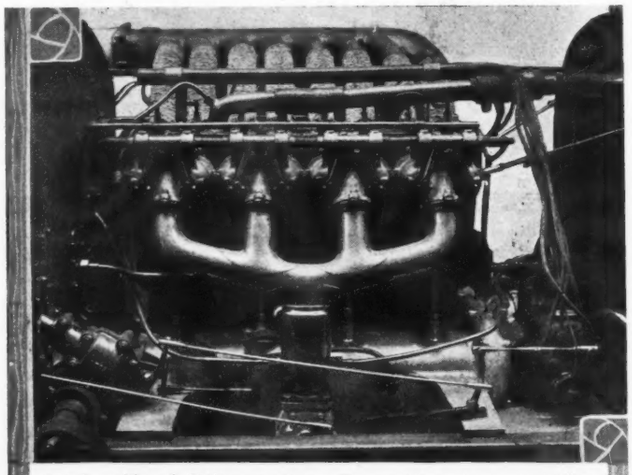
14 Miles to the Gallon

When the Delage cars were racing in Europe their mechanical features were jealously guarded. Now that the European rules have been changed and the cars are coming to America, the engineers have consented to something like a detailed exploration of the features being undertaken. These machines, like all the Europeans entered for the 500-mile race at Indianapolis, were built under a limited fuel consumption rule of practically 14 miles to the gallon. This accounts for the comparatively small cylinder area.

Delage selected four cylinders of 105 by 180 mm., 4.1 by 7.08 inches, bore and stroke. The cylinders are a block casting. This general design of cylinder had been employed 2 years previously when Delage won the French 3-liter race.

A feature of this motor is the use of ball bearings throughout, in order to secure the highest mechanical efficiency. The crankshaft is carried in five robust M & B ball bearings; there are five ball bearings for the camshafts; ball bearings are also used for the auxiliaries: pump and magneto shafts. The use of a five-ball-bearing crankshaft entailed certain difficulties, for it necessitated a built-up shaft in four parts, and to get a correct balance with such a shaft was not an easy matter. A certain reserve is maintained regarding the details of the shaft, for this feature of the design is being incorporated in the present year's cars. The crankshaft is hollow, as are also the camshafts. In order to give the greatest possible rigidity to the motor, while securing lightness, a girder is carried under each main bearing. This girder is of H-section and of BND steel. Around each ball race there is a kind of cage which performs an important function described in connection with the lubrication.

As can be seen from the illustrations, there are four valves per cylinder. These are mounted horizontally, and have a



Intake side of Delage motor. Two independent magnetos are carried on the cross shaft

A detail of valve operating mechanism on Delage racers for Indianapolis. There are four valves to each cylinder. These are mounted horizontally and have a diameter of 55 millimeters and a lift of 9 millimeters

diameter of 55 millimeters and a life of 9 millimeters. The valve operation is by vertical push rod and a bell crank, Fig. 3, each one having two arms and operating a pair of valves. Lightness has been obtained in these parts, the valve tappets being hollow and only 1 millimeter thick, and the vertical push rods also being hollow and of the same thickness. The exhaust is brought out at an angle of practically 45 degrees, there being a separate pipe from each valve port, Fig. 4, into the long exhaust pipe carried to the rear along the left-hand side of the car.

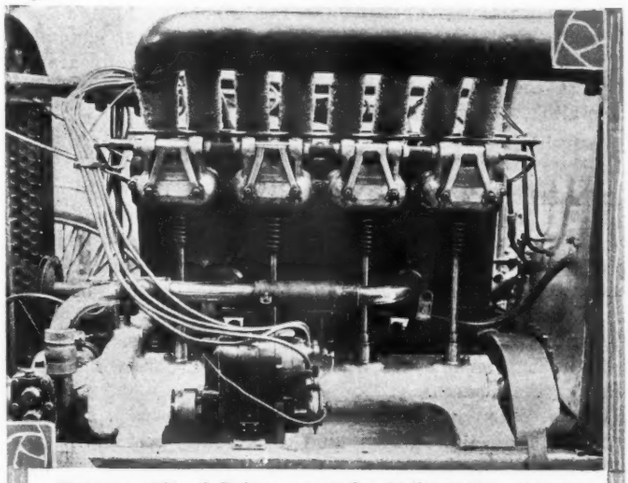
Valve timing is not exaggerated, the exhaust opening having a lead of 45 degrees and the intake closing a lag of 20 degrees. The motor develops 120 horsepower at 1850 revolutions.

BND steel is made use of extensively in the motor. It is employed for the crankshaft, connecting-rods, and valve gear. Steel pistons are used with two rings having bayonet type joint. The pistons are drilled; the central portion is of smaller diameter than the top and bottom, and oil grooves are provided. Connecting-rods are hollow and are machined conically. There is a cylinder offset of 25 millimeters, or 1 inch, from crankshaft center.

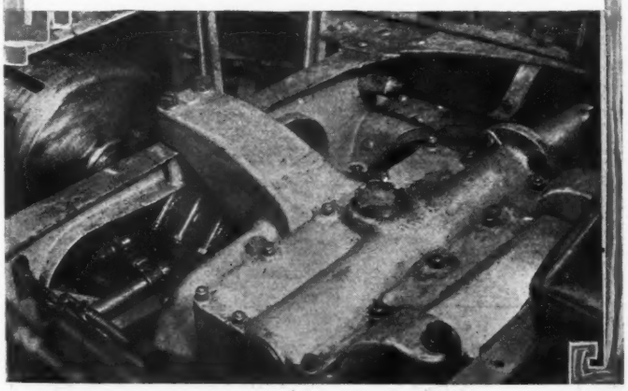
Two Magnetos Fitted

Two independent magnetos are fitted, one driven off the cross shaft operating the water pump, and the other is set fore and aft on the exhaust side.

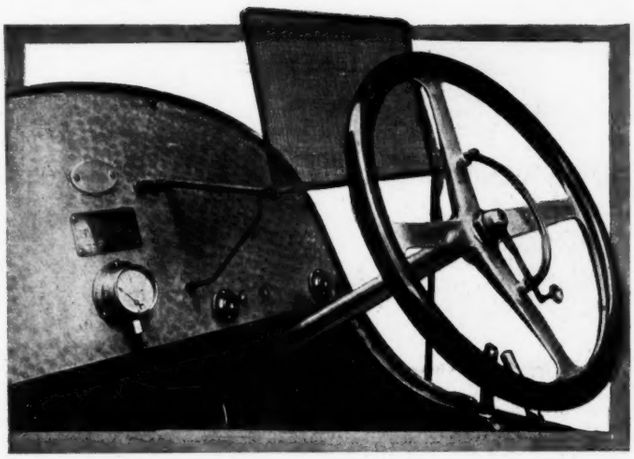
The eight plugs are mounted in the heads of the cylinders, but as far apart as possible. Each magneto has its own switch, mounted on the dashboard, thus enabling the driver to cut out either magneto for purposes of testing. While the failure of either magneto would not stop the running of the car, it is found that much better results are obtained with the two magnetos firing simultaneously.



Exhaust side of Delage racer for Indianapolis, showing separate pipe for each valve port at 45 degrees angle



Five speed gearbox with three-point suspension used on Delage racer. These cars have five speeds and reverse, but the first speed is really an emergency gear and is covered by a clip like the reverse



Steering wheel and aluminum dashboard used on Delage racers. Note windscreen for driver

Lubrication is interesting. A gear pump in the base chamber and driven off the intake camshaft, delivers oil through a collector to the main bearings. In this collector there is a hand regulated valve and three leads, one to the main bearings, one to the overhead valve gear, and one to the dashboard pressure indicator. With the valve closed the whole of the oil goes to the main bearings and none to the overhead valve gear, the pressure on the indicator thus attaining its maximum. The valve is always kept open a certain amount, allowing a quantity of oil to escape to the valve gear; the pressure indicated on the dash indicator is the actual pressure delivered to the bearings.

Cage Around Each Ball Bearing

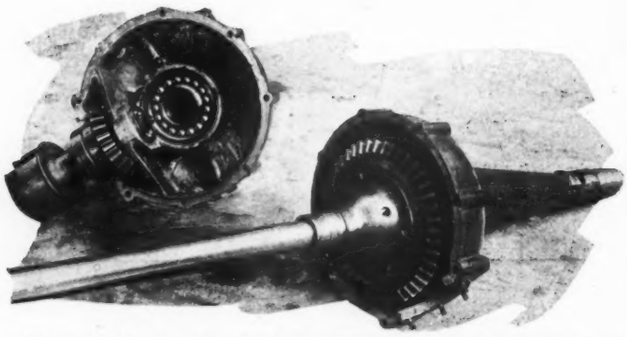
As already mentioned, there is a cage around each ball bearing. This insures a constant bath of oil for each bearing, and also enables the bearing to drive out the lubricant centrifugally into collectors delivering it to the connecting rod ends and to the camshafts and piston walls. The system can be described as a centrifugal one, the function of the pump being limited to keeping a supply of oil in the housings around each main bearing. The overflow from the collector is carried up to the axis of the bell cranks. All these are united by flexible tubes, the shafts being hollow, and a complete circuit is maintained in the two sets for respectively exhaust and intake valves. From this lead for the valve gear, there is a return to the base chamber by way of the timing gears.

In addition to the oil in the base chamber, there is a supplementary tank on the dash with a feed to the motor. The flow from this tank is regulated according to conditions under which the motor is running, and is made sufficient to maintain the correct level in the base chamber. To prevent an excess, through inattention or any other cause, there is an overflow on the side of the chamber, the superfluous oil being lost on the road. This arrangement makes practically impossible a fouling of the plugs through excess lubrication.

In all their French races these cars have been fitted with Claudel carbureters and Bosch magnetos.

Rigid Mounting for Motor

Rigid mounting is adopted for the motor, which is placed directly on the main frame members. The gearbox, however, has three-point suspension to a couple of transverse frame members. The connection between the two is by multiple-disk clutch. Designed for road racing, the cars have five



Above is shown the aluminum differential housing pinion and universal joint on the Delage driveshaft. Below, rear axle with hollow driveshaft having bearing on both sides

speeds and reverse, but the first speed is really an emergency gear, and like the reverse is kept covered by a clip on the gate. While the housing is of aluminum, the whole of the interior of the box is of BND steel, the shafts are hollow and are carried on M & B ball bearings.

One of the most interesting features of this set of cars, and one in which the fine workmanship is most apparent, is the rear axle. The material used is BND steel with aluminum for the differential housing. The conical axle tubes are machined out of the solid forging and have a thickness varying from 3 to 4 mm. They are bolted to the central housing, and the halves of this are in turn bolted together around their circumference. The differential housing is a fine piece of work designed with a view to minimum weight and maximum strength. It is deeply ribbed where it receives the bolts attaching it to the axle tubes, and has a vertical wall in which is carried the rear bearing of the driveshaft. The driving pinion is thus carried in ball bearings front and rear. The driveshafts are hollow; the differential satellites are bevel type. By reason of the use of high-grade material and correct design it has been possible to get the weight of the complete rear axle to the unusually low figure of 170 pounds. In this weight is comprised the axle complete, the rear universal joint, and the brake drums. This low unsprung weight is responsible, in a very large degree, for the remarkable manner in which the cars hold to the road at high speed.

Broad semi-elliptical springs carried above the axle are relied upon to take the drive, the propeller shaft in consequence having two universal joints.

Car Weighs 1,900 Pounds

Total weight of the car, with tanks empty, is 1,900 pounds. This low weight has been obtained by the use of the highest grade material in every part. This applies to such parts as brake and change speed levers, change speed gate, brake rods and levers, etc., where dimensions are reduced to what in standard car practice appears like flimsiness, and would indeed be such if special steels had not been employed. Aluminum figures very largely in the makeup of the car. It is used for the bonnet, scuttle dash, seats, floor boards, dashboard. The only wood on the car is to be found in the steering wheel.

For participation in the Indianapolis race the cars have undergone few changes. Gear ratio has been modified to suit track conditions; the latest type of Rudge-Whitworth wire wheels has been adopted, and one of the cars at least will carry a streamline tail. In European racing circles the Delages are looked upon as the fastest of the foreign contingent. Certainly the cars are among the finest examples of racing productions in the Old World, and their appearance against the cream of America assures for Indianapolis a race altogether unequaled in intensity.

Texas Buys 24,385 Cars in the Past 2 Years

DALLAS, TEX., April 3—Thirteen years ago the first automobile sold in Dallas was delivered to its owner. Last year there were sold from Dallas 11,900 automobiles, 674 motorcycles, and tires and accessories to a total value of $18,000,000. And the ratio of growth is getting bigger as the business develops. Another interesting fact about the automobile business of Texas is that nearly 80 per cent. of the cars sold in the state are to farmers. This is having its effect in the growth of the good roads sentiment throughout the state. While Texas has many hundreds of miles of good roads there is still room for improvement and this improvement is being made steadily. At this time good roads bonds are being voted at the rate of $7,000,000 annually and this amount is steadily growing as the ruralist learns the value of better facilities for getting about.

In the state of Texas there are now 54,368 automobiles valued at $62,085,256, one machine for every seventy-three of population as against one machine for each ninety-six of population in Pennsylvania, and one for each seventy-four in the state of New York. An idea of the growth of the automobile business may be had from the fact that the people of this state have purchased 24,385 cars during the last 2 years.

These conditions suggested to the Ford company the necessity of constructing in Dallas one of the twenty-three sub-factories which it is now building throughout the United States. Last year the Ford company distributed from Dallas automobiles and accessories valued at $3,000,000 and it was deemed expedient to locate one of the sub-factories here. The factory is now nearing completion and Mr. W. A. Dame, the supervising architect in charge, is authority for the statement that it will be the most complete and finest of all the factories now being built by the Ford company.

Of full reinforced concrete and steel construction, built under the Condron patents, the new building will be of modern fireproof construction. It will be 116 by 204 feet, four stories and finished basement and will have a testing track 1-8-mile long on the roof where the finished cars will be put through their paces.

On the first floor will be a complete garage with washing racks and all the fittings and accessories which are required in the equipment of a first-class garage. There will also be show rooms, 25 by 75 feet and general offices 92 by 50 will also be provided.

The second, third and fourth floors will be devoted to working and assembling the parts which will be sent here in the rough to be worked into finished cars. Starting on the second floor the embryo car will make its way to the roof.

The new Ford factory now nearing completion at Dallas, Tex.

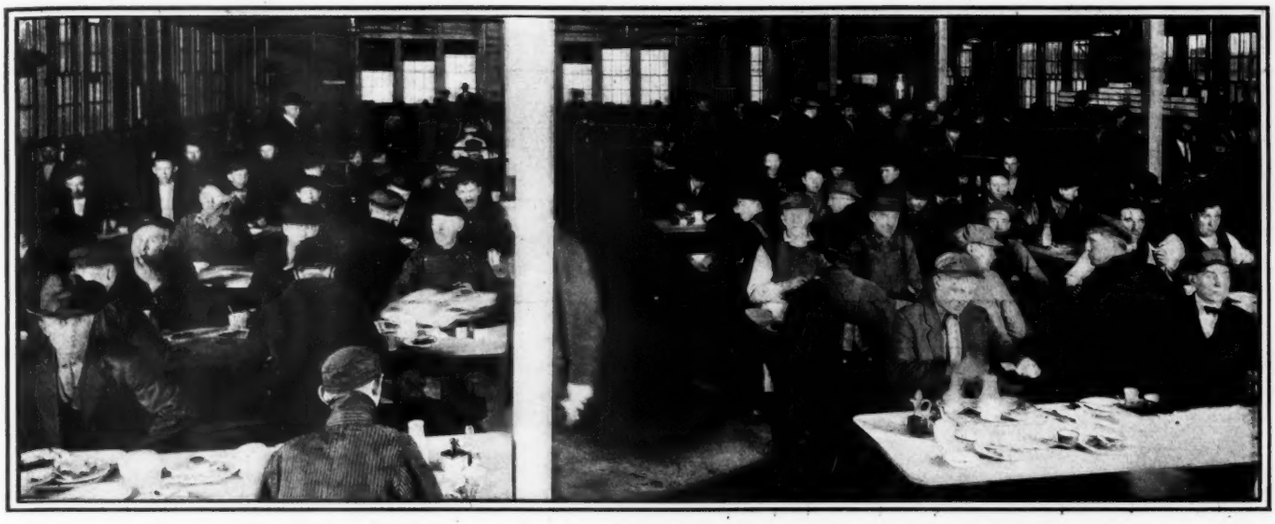


Fig. 1—View of Chalmers restaurant, 60 by 150 feet; 1,000 meals per day are served here

Many Detroit Plants Have Lunch Rooms

Men Get Better Food—Time Is Saved—Are Patronized by Two-Thirds of Employees—Men Wait on Themselves

By L. V. Spencer

MOST of the large automobile and accessory factories in Detroit are located a considerable distance from the business center of the city, just as are a great many of the other big industrial plants in any city. This is largely due to cheaper property. Consequently the problem of lunching the workmen at noon time has arisen and has been solved in a very satisfactory manner in a number of companies.

It is a recognized fact that it is a poor policy to allow the eating of lunches anywhere at all about the factory, and hence the lunch room scheme has met with great favor. Not only does it satisfy the slogan, "A place for everything and everything in its place," but it is a betterment of industrial conditions which works to the advantage of the manufacturer and the workman alike. The latter gets better food at a small cost and this tends to increased efficiency, and it keeps the men within the factory largely to the disadvantage of the nearby saloon.

Nearly All Are Self-Serving

There are about a dozen lunch departments to be found in the motor industry's factories in Detroit, some of which are shown in the illustrations herewith. Nearly all of these operate on the self-serve, or cafeteria plan, the workman taking a tray and passing before a counter on which are the various wholesome foods. He helps himself then passes on to the cashier who receives the nominal charge.

The average luncheon costs 15 to 20 cents, which includes some hot meat together with bread and butter and potatoes, coffee and pie or pudding. This should be enough to satisfy any man, and it does. The prices range about as follows, for example:

Sandwiches	5 cents
Coffee	3 cents
Salads	3 cents
Vegetables	5 cents
Soups	5 cents
Roasts, stews, fish, with bread and butter and potatoes,	10 to 15 cents

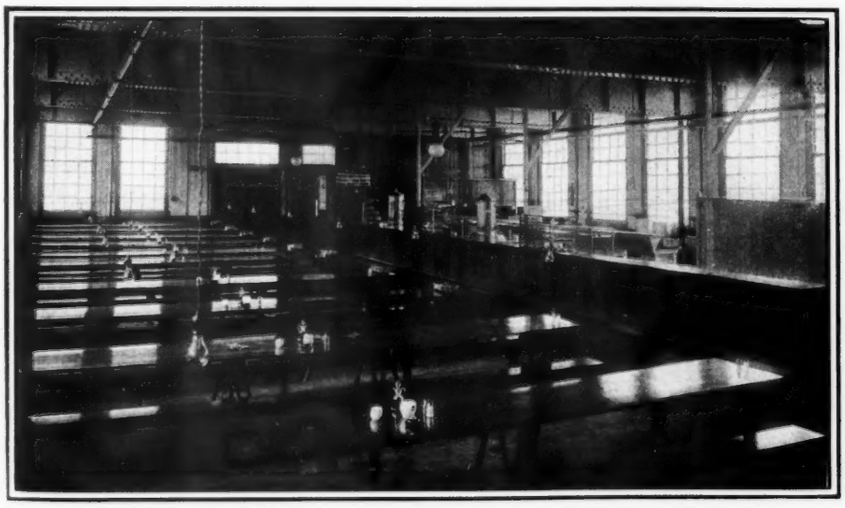


Fig. 2—Corner of Packard lunch room. About 3,000 men are fed

These figures are given by H. C. Spillman, engineer for the Continental Motor Mfg. Co., and afford an idea of the low prices which must be asked in order to get the workmen to patronize the establishment.

The serve-self plan works best, as time is a big consideration. In most factories, the men are given half an hour at noon, and thus they must receive their food and have time enough

Fig. 4—Part of the lunchroom for the employees of the Continental company

to eat it. If waiters were provided, much time would be lost in putting the food before the men and the cost to the management would also be greater.

In the average case, the lunch room feeds fully two-thirds of the men, and this amounts up into a big crowd. In each installation, careful study is made of all conditions, and the arrangement of the tables and equipment is made to eliminate all waste time. Everything is usually placed where it is most convenient and some 200 or more men are taken care of per minute.

In most cases, the factory rents the privilege to a caterer, who furnishes all the needed equipment such as kitchen utensils, silverware, dishes, urns and so on. The factory in turn gives the space, furnishes light and heat and provides the counters, benches, tables and the like. This allows the caterer to operate with the minimum of overhead, and hence he can serve good wholesome food at low cost and at a reasonable profit.

Special Rooms for Officers of Companies

In nearly every case, a part of the lunch room is partitioned off for the dining room for the officers and heads of the several departments. This makes a good meeting place for them at noon where they can get together in a friendly way and talk over matters of interest. This feature of the lunch rooms finds as much favor with the officers as does that part for the workmen. It saves a lot of the time which would be used in getting down town, and is obviously more convenient.

The illustration, Fig. 4, shows the general layout of the lunch rooms at the Continental Motor plant, which is laid out for the seating of 300 men at a time. There is one main entrance to the room. Passing up the center aisle, each man takes a tray from the pile at the front end of this aisle and passes in front of the counter both sides of which have identical foods to offer. Selecting what he wants, the man passes to the cashier and then to the tables, having taken the required knives, forks and spoons from the supply at either end of the room. He must pass these to get to the tables. Having finished eating, the men go out through other doors so there is no congestion or confusion between those coming in and going out.

About 73 per cent. of the Continental working force of 1,200 men take advantage of this well appointed and maintained lunch room.

The Chalmers Motor Co. provides for its men a finely

Fig. 3—Workmen in Studebaker factory patronizing the milk cart

equipped restaurant. Here under direction of A. Wales over 1,000 meals are served every day to employees. The restaurant proper is 150 feet in length by 60 feet in width. Two rows of long tables and benches are stretched from side to side leaving an aisle in the center.

The restaurant is conducted on the serve-self principles and a menu is provided that is changed every day and takes in a list that rivals the big hotels. The charges are reasonable. The building is supplied with heat and light by the Chalmers company to Mr. Wales, who runs the restaurant. In this way his overhead is cut down so that prices are very low and at the same time the quality of the dishes is kept up

Three meals are served daily, the noon day meal, of course, bringing the rush.

3,000 Men Use Packard Restaurant

About half the working force of 6,000 men at the Packard plant take advantage of the lunch room, which has been

a part of the Packard factory organization for some 10 years —almost as long as the Packard itself has been an institution. From 15 cents to 25 cents will purchase for the workman all the food he wants.

The lunch room is operated on about the same plan as the rest. The company gives the space and furnishes all of the permanent equipment such as tables, benches, counters and so on, besides providing light and heat. The caterer who has the privilege of serving the men has been with the company from the start, and makes a reasonable profit. He must supply all of his utensils, dishes, silverware and the like. The Packard company considers its lunch room as important as any other department of its factory.

Hupmobile Devotes 10,000 Square Feet

Ever since the Hupmobile plant has been in commission, it has had a serve-self lunch room as a part of the factory. This is located on the second floor of the factory and occupies about 10,000 square feet of floor space. The particular part of the factory building in which the lunch room is situated was chosen because it is over the stock room and here there are none of the noises and gasoline smells which might be necessary evils in any other portion of the works.

A feature of the lunch room of the Hupp Motor Car Co.'s plant is that a specialty is made of a 20-cent meal which is very popular with the men, although they can get other dishes at nominal prices. The 20-cent luncheon consists of soup, some kind of meat and potatoes, a vegetable, bread and butter, coffee and dessert. Some may wonder how this can be possible for the price, but the caterer makes a profit on it. The noonday crowd is about 750 strong in the Hupp restaurant, while at night from 200 to 300 men are fed. The lunch room is open until 8 p. m. to take care of the night crowd. It is operated by a caterer, who gets his light, heat and permanent fixtures free, as well as the space.

Maxwell Room Open Morning and Evening

At the Oakland avenue plant of the Maxwell Motor Co., Detroit, the lunch room takes care of 500 to 600 men at lunch time. Here a good lunch can be obtained at the usual nominal price of from 15 to 25 cents. All dishes are priced at from 3 to 5 cents. Besides furnishing a noon meal, this restaurant is kept open in the morning and in the evening, so that all three meals may be obtained there if desired. The lunch room at this plant has always been one of its institutions, having been in operation when it was the scene of the manufacture of Brush cars before the Brush company was taken over by the Maxwell company. It is about 4 years old, and has always proven a success from the efficiency standpoint to say nothing of the great convenience to the men.

A caterer has charge of the lunch room. He is given his gas, electricity and heat, and also is accorded the space and the permanent fixtures, as in most other cases.

Studebaker Has Separate Lunch Room

The Studebaker Corp. has never yet been able to use space designed for the purpose of a lunch room in any other way than for the immediate needs of production. Recognizing the feasibility of the lunch room scheme, however, it is stated that some time the organization hopes to be able to get far enough ahead in floor space to enable it to get a lunch room going.

The Studebaker Corp. does, however, maintain a lunch room across the street from the main gate of its large plant on Piquette avenue, Detroit, where food is furnished at cost to the employees. This has proven very successful and is much appreciated by the men. The corporation also distributes at cost prices and at stated periods during the day as well as throughout the lunch hour, a prodigious quantity of milk in half-pint bottles. The "milk carts" are wheeled through the plant and are eagerly awaited by the men. Fig. 3 shows one of these carts in operation.

An Emergency Puncture Repair

In case you have a puncture and have no rubber patches a permanent and dependable repair may be made on ordinary holes and small cuts as follows. Clean the tube around the holes as usual; take some of the dried cement from the old cement tubes lying around in the tool box, or elsewhere, as long as it has little dirt in it. Or spread some cement on a piece of glass, metal or varnished surface to dry thoroughly, then scrape it off. If too dry to be worked into the shape of patch required, moisten slightly with gasoline. Make up a thick disk about half an inch in diameter, thin at the edges and nearly or quite one-quarter inch thick at the center. This is suitable for a hole not more than one-eighth inch in diameter. Put cement on the tube around the hole, allow it to dry as usual, and then put the disk in place carefully centered over the hole. Press it forcibly and use the butt of a knife or some small flat or rounded object to press the edges of the patch until they are nearly or quite flush.

If the cement or tire dough has dried sufficiently before use, the tire may be immediately used without danger, and the evenly distributed pressure exerted by the air all over the patch will prevent the air from working through it even though it seems rather plastic when put on.

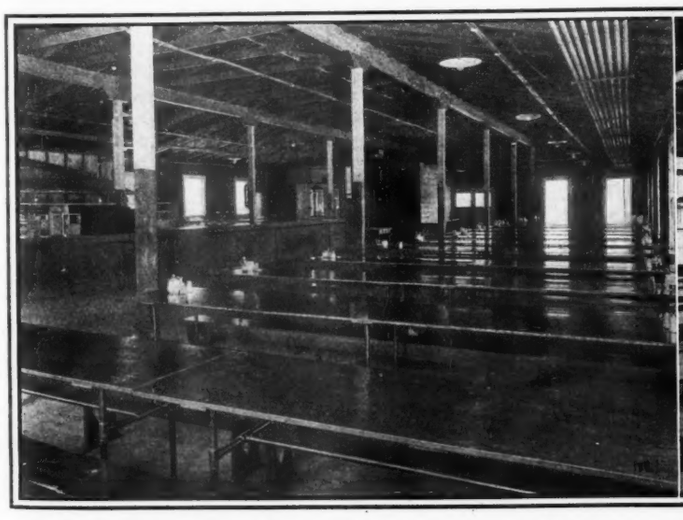


Fig. 5—Hupmobile lunchroom, 650 to 700 men fed every noon

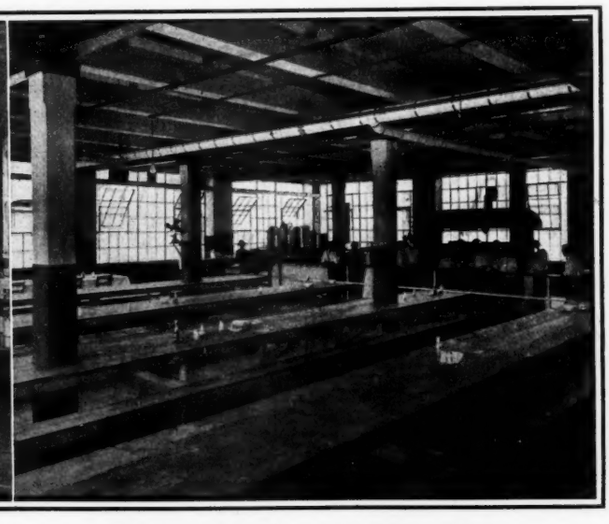


Fig. 6—Lunchroom at Chalmers factory

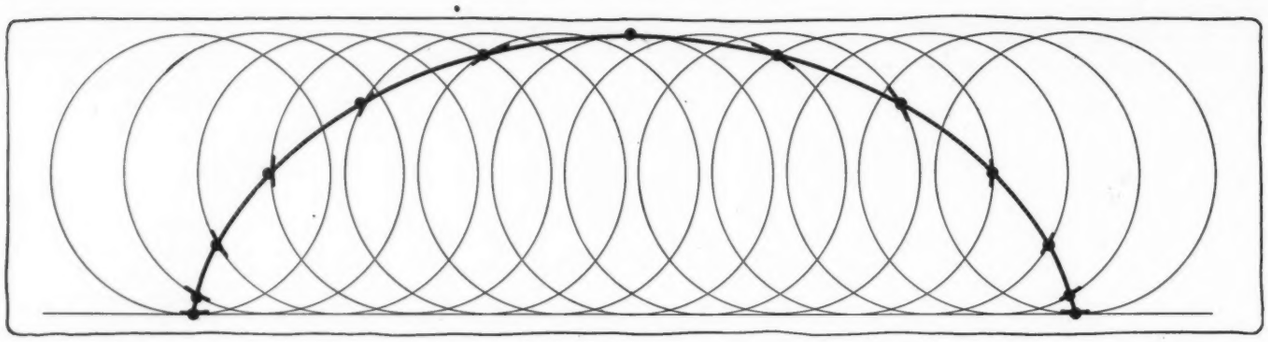


Fig. 1—A cycloid, the locus of a point in a circle rolling in a straight line. Only at the top instant can a tire tangential discharge occur, since a particle must continue in a straight line if free from applied forces

The Theory of Fender Design

The Automobile Engineers' Forum

Three Points of Offense from Mud-Fouling—Cycloidal Discharge from Wheels, Fouling from Side-Wind and the Vertical Discharge from Mud-Filled Ruts

SANDY HOOK, CONN.—Editor THE AUTOMOBILE:—The average automobile engineer has a fondness for reveling in the intricacies of motors but is inclined to use a lorgnette when contemplating the humble problem of mud splash. Internal combustion engineering, while admittedly entrancing in its technical ramifications, is not paramountly important in rounding out the commercial designing engineer in his fullness of general efficiency. The remarkably superior motor is a thought of the scientist spoken in the words of the fine machinist, and contemporary prominence given engines is habit, holding from the days when a man who got an engine to run at all was lionized. Today we are more apt to criticize a car because of a mud spot in our all-seeing eye than cavil at the performance of average motors.

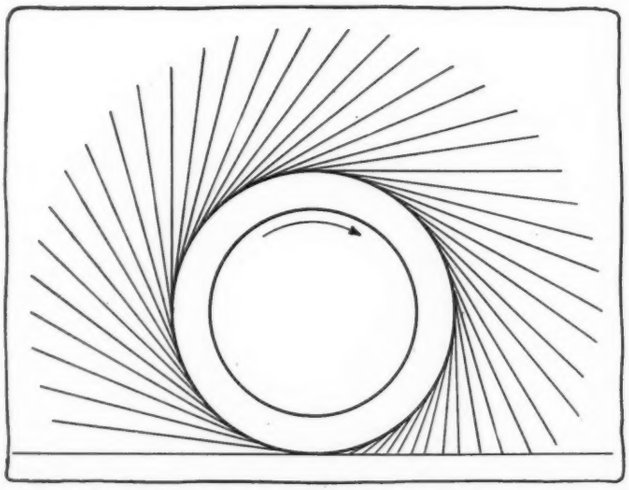
Little Attention Paid to Fenders

The present automobile fender is a progressive elaboration of the old time carriage guard whose intent never contemplated high velocity of discharged matter. These old devices simply stopped a throw not having sufficient energy to split itself into a thousand parts and distribute all over everything. Unconsciously we enlarge their design to match our conceptions of massiveness obtaining in the modern motor car, but seldom have they been made the subject of study and experiment tending to properly handle the moving particles of mud and water, coming from the car wheels.

There are two points of offense from mud fouling peculiar to a car at speed and a third about the same in violence irrespective of the rate of travel. The first two are cycloidal discharge from the wheels and the fouling from side wind; the third vertical discharge when passing through a rut filled with water or soft mud.

It will be noticed we use the term cycloidal discharge. Common conception of mud or dust flung from the wheels is somewhat like the idea popularized by enthusiastic journalists who picture the plutocratic automobile fleeing from pursuit after a slaughter of widows and orphans with mud or dust shooting off the bottom of the wheel. Unfortunately a good many automobile designers without stopping to think embraced the same idea.

That such is not the case, however, will be appreciated from inspection of Fig. 1, showing a cycloid, or the locus of a point in a circle rolling on a straight line. Only at the top instant can a tire tangential discharge occur since a particle must continue motion in a straight line if free from applied forces. At the several points we have shown the respective wheel surface by heavy portions of the circle and it can be readily grasped by simple geometry that the instant matter leaves the tire it must continue in a tangent to the curve of the path it was traveling at the time of the rupture. This is a tangent to the cycloid at any point and not a tangent to the wheel.



. Fig. 2—A wheel spinning on a stationary shaft is a very different dynamic proposition from one on a car, the tangential discharge being circumferential

Stationary Shaft Wheel

The old idea was established from the sight of a wheel spinning on a stationary shaft, Fig. 2, which is quite a different dynamic proposition from a wheel revolving at an equal rolling rate. If the former were true, most violent discharge would exist close to the ground and to the rear; which is not the case, there being at contact separation

a pure lifting motion almost vertical. Inception of the cycloid draws out a water-web or pulls up the dust should the surface be dry. Reference to the cycloid Fig. 1 precludes the possibility of mud shooting backwards under the running boards at a tangent to the wheel, and opens up opportunities for the mathematically inclined to establish a bursting ratio between the spinning and rolling speed.

More startling is our correction when we look at Figs. 4 and 5. The sling from the spinning wheel is an assembly of parabolas, Fig. 4, whose amplitude depends upon the angle of their origin but whose velocity at that point is alike in every case. Now in Fig. 5, we have a general sketch of similar paths from a rolling wheel at the same speed. The first little particle is lifted a very small distance and goes forward only an increment, the next a little higher and more forward; and so on, until at the top of the wheel the velocity is twice the speed of the vehicle. On account of the violent acceleration in the cycloid the friction between the tire and the mud is generally overcome in the first half revolution and largely in the quarter, causing most of the discharge to take place at this point while forward motion of the car gives impression of circular tangential discharge to the occupants.

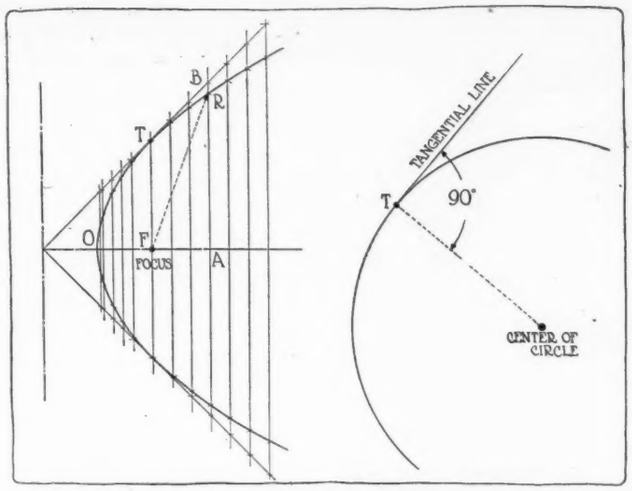


Fig. 3—Left—The construction of a parabolic curve. The distance A B is equal to the distance from the focal point F to the point R on the parabola. A tangent to the circular arc, as shown at the right, is a line at right angles to the radius at T

Fenders Overtake the Mud

It will be now realized that the fenders *overtake* the mud as it is traveling vertically and forward so that in the case of front protection the catch is heavier than rear. Carrying the rear fender back over the wheel in its plane, will not, in the light of these facts protect the folded down top, unless it catches that discharge from such an angle where the velocity overtakes the car in spite of wind resistance above the fender. Many designers have rested happy from top foul when they carried the rear fender backwards until it intersected a line drawn from the end of the top to the back of the tire. If this line happened to be vertical to the road or slightly backwards they were safe, but if inclined forward a trifle they wondered when they saw the underside of the top materialize a strip of foul a foot long.

Close Front Fender Is Efficient

In the case of the front fender because of car motion we catch the discharge almost perpendicular to the surface and here lies the beauty of a fender close to the wheel curve. Many people criticize this fender from an artistic point of view, claiming that it lends the car a chubby appearance, but its allowance of the spare tire being moved up clear of doors with six cylinder hoods will greatly champion its use. The reason the shape is so good is because the discharge strikes the surface at an angle and slushes up in stopping rather than breaks up after the nature of a baffle plate and distributes to the four winds of Heaven.

Another prominent fault is running board foul, which also can be traced to cycloidal discharge. When the car is traveling on an arc short enough for the front wheels to throw clear of the lower middle edge of the fender, the mud will roll over onto the top side partly from dead water regions in the air and partly from side wind or transverse movements of the body. This can be taken care of by a gradual side flare in the fender edge to take in a larger incline of the wheels, and our conventions would not be outraged thereby. The conventional bird's-eye view of a car is a straight line fender and running board edge, whereas the above would call for a swell, returning into the board at the point of juncture. A moment's thought will dispel the criticism that such a design will strike when swinging around to a deep curb, because the outline falls within the arc of the wheel travel. The necessary amount is so small, relatively, that no inconvenience is experienced in straight driving in the matter of passing, sufficient clearance being usually allowed.

A Detail May Spoil a Design

When you are traveling deep in a rut filled with water the violent vertical discharge from the sides of the tire is something that only overhang, and that as low as possible, can stop within an angle that will insure its non-return to the body sides. The larger the wheels the further the fenders from the ground and the more clever the designing necessary to keep the angle large. If you permit a sheet of water to rise clear of the fender in a plane practically vertical, the slightest side wind and even the suctional air return of the car will pull the whole mess into the side of the car. Further if your design has the smallest aperture anywhere along the line of fender and body joint the foul will shoot through it as though under pressure. A small cut-around to clear a bracket of some other insignificant detail will sometimes let the mud straight up to the windshield, at the smallest puddle, if taken at speed.—CHARLES BOYDEN, chief engineer, Electrical Engineering & Storage Battery Co.

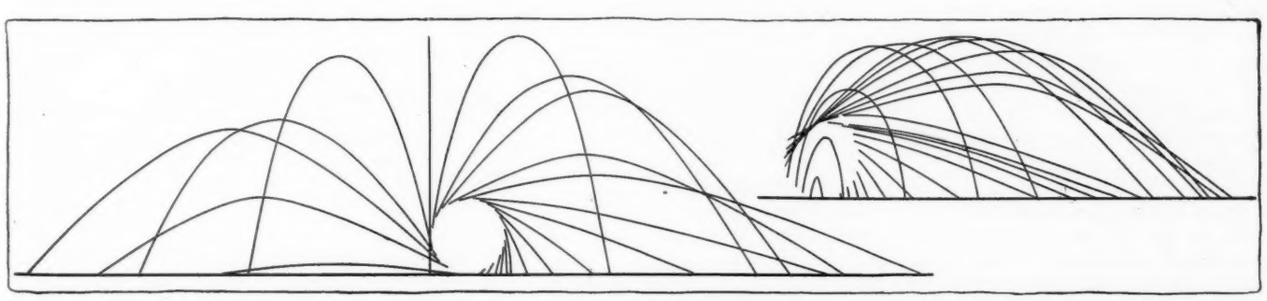


Fig. 4—The sling from a spinning wheel is an assembly of parabolas whose amplitude depends on the angle of their origin, but whose velocity at that point is alike. Fig. 5—Similar paths from a rolling wheel at the same speed

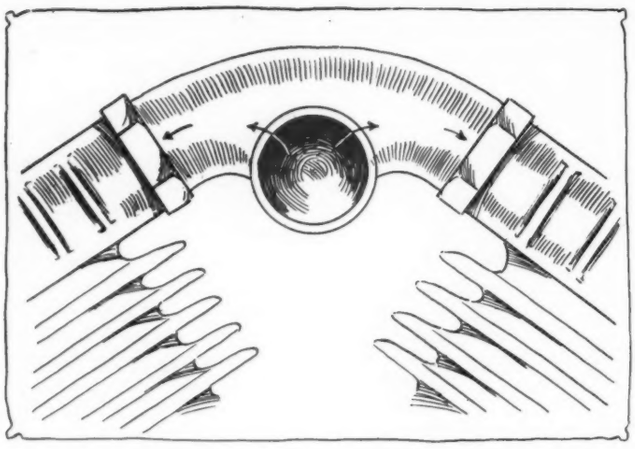


Fig. 1—A fault of V-motor carbureters is the wrong drain of the intake manifold. This should drain toward the carbureter

V-Motor Kinks for Cyclecars

Low Gear Ratio Improves Cooling—Carbureter and Manifold Design Far from Perfect

By William B. Stout

A MAJORITY of the light-type cyclecars are using V-type motors, the makers preferring the twin-cylinder type as giving greater efficiency for the weight than the four-cylinder when the pistons would have to be as small as demanded, if the 71-cubic inch displacement were divided among four cylinders. If bigger cylinders, and over 71 cubic inches, are used the weight goes beyond that sought by cyclecar makers. The twin motor will probably be used for some time, but whether the motors remain air-cooled or not depends on the rest of the design of the car to which they are fitted.

In fitting a V-type, air-cooled motor, one must observe how it is installed. You can take a 71-cubic-inch motor and pull a 700-pound, 36-inch tread car very well on a three to one gear ratio. This will run the car up to a 35- or 40-mile speed, but the motor is revolving at a slow speed compared to its possibilities and a fairly wide open throttle is used for average running, the motor having a hard pull also in starting.

Acceleration Is Slow

The getaway of a car so geared is slow even with a friction gearset and a quicker start, more speed, and better motor cooling can be obtained with a 4 or 5-to-1 gear ratio than with the higher gear. These V-motors develop best power at about 2,500 r. p. m., and hence the car should be so geared that at the maximum speed desired, which will be about 45 miles per hour, the motor will be working at 2,500 r. p. m.

A 28-inch wheel covers 7 feet per rotation, or 826 revolutions per mile. At 45 miles per hour the car will cover .75 mile per minute, or 4,335 feet. This would make about 620 r. p. m., of the wheels at the speed wanted, and a 4-to-1 gear ratio would mean 2,480 r. p. m. of the motor at 45 miles per hour.

Some of the V-motors develop their power up to 3,000 and with them a lower gear yet will give better results. To fit too high a gear is to invite overheating of the motor and to invite added weight to get rid of a trouble not due to cooling alone.

Many Manifolds Faulty

There are a number of faults of the V-motor which can be overcome very easily, once understood. One is in the shape of the average intake manifold. This shape and arrangement hinder easy starting and even running.

When the motor is cranked over cold, the gas sucked from the jet is in a raw atomized state and, starting to gasify from the vacuum effect, leaves the carbureter and enters the manifold. This is an enlarged chamber and the vacuum drops, thus condensing the spray to a form of liquid or frost deposit on the walls of the manifold, especially on the outside curve of the elbows. As the gas enters, this forms a liquid and flows down, draining not back into the carbureter or restricted passages which would tend to gasify it again, but draining toward the cylinders, increasing the fault. The direction of drain is shown by the arrows, Fig. 1. This condition is responsible for many of the carburetion difficulties met with in fitting types of carbureters which do well on other types, to this V twin motor.

A greater fault is found in many carbureters for this type of motor in the location of the butterfly throttle. This is set vertically and closes crosswise in the intake pipe, Fig. 2. The incoming gas is by this means diverted to one side of the pipe in low-throttle positions, and hence the left cylinder (if the carbureter is in front) gets the most of the charge and is always the cylinder to fire first in starting. On wide-open throttle both cylinders pull the same, but it is known practice, that when you throttle these motors one cylinder stops firing first, the left-hand cylinder.

If this valve were put horizontally in the pipe, then both cylinders would get equal supply and the motor would throttle lower with no missing.

The short intake on V-motors is a great advantage in starting, but at speed a longer intake would give advantages, especially if it were heated. The intake of a V-motor is so short that the time given the liquid to gasify is very much shorter than on other types, leading to more carburetion study. This would indicate more efficiency with longer intake manifolds, but harder starting.

Pilot Jet of Service

To overcome this a pilot jet arrangement is recommended, as used by foreign cyclecars with V-motors, a small auxiliary jet close to the cylinders coming into play when the throttle of the main carbureter is shut off. This gives a rich mixture and acts almost as a primer for starting, and shuts off when the motor is really going. Once the intake manifold is warm a long manifold is a small objection.

In case a pilot jet is not fitted a primer can be used, but this should deliver the gasoline direct to the cylinders instead of to the manifold, and preferably in spray form. The smaller the spray the greater the evaporating surface the liquid exposes to the air in the cylinder, though spray itself will not explode.

Testing the Ignition

When the cylinders explode unequally one can cut out either cylinder by shorting the plug of the other against some part of the motor connecting the plug top with the metal by a screw driver or metal connection, Fig. 3. This will allow this cylinder to idle and the other one can be studied. Do this in short spurts, however, so that the plugs may not be fouled by oil.

As to oiling, this should be sure on an air-cooled motor, and the exhaust should always smoke a little. This latter is for safety.

Present V-motors are drawing narrow-tread cars well, and

when made a little more foolproof, possibly by some light simple water-cooling, will be almost ideal for the cyclecar. When water-cooling comes, however, the motor will probably be a vertical twin, with cranks opposed, as this type is cheaper to make and fits better under the hood. It is also easier to cool, carburetion and ignition are simpler, and the motor can be spun by a crank in starting. No motors of this type are now made within the 71-inch limit, but will be available shortly. The four-cylinder will also be used if it can be made light and cheap enough and if the rings can be made to hold. Price, power per weight, and vibration will determine the eventual cyclecar motor.

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Recent Decisions of the Courts—Dealer Liable in Texas Case

IT was held in a recent Texas case that, where a seller of a second-hand car agrees to furnish a competent man to instruct the buyer, the instruction is presumed to extend over a reasonable time.

In this case the buyer of the car was injured through the negligence of the instructor and recovered $5,000 damages for his injuries from the seller, by whom the instructor was employed. The car was a second-hand car. It turned turtle and threw its occupants into a ditch while being driven around a curve by the instructor at a speed of about 30 or 40 miles an hour. The Court held that the negligence of the instructor in taking a turn at that high speed was the negligence of the seller, as it was the dealer's duty to furnish a careful driver and for that reason the $5,000 judgment was ratified.—*Buick Automobile Co. vs. Weaver*, 163 *S. W.* (*Tex.*) 594.

Accident Not Chauffeur's Fault

A chauffeur who blows his horn, applies his brakes, and diminishes his speed, is not legally responsible for not stopping if confronted by someone on foot so suddenly that he is not able to stop. This is a particularly interesting point as accidents of this kind are happening every day.

In a recent New York case a 4-year-old child was out walking with a 4-year-old brother and 15-year-old sister. The child suddenly broke away from the others and ran out into the street and was struck by an automobile. Its parents brought an action for damages, and, although the jury found that the chauffeur was going at a prudent speed

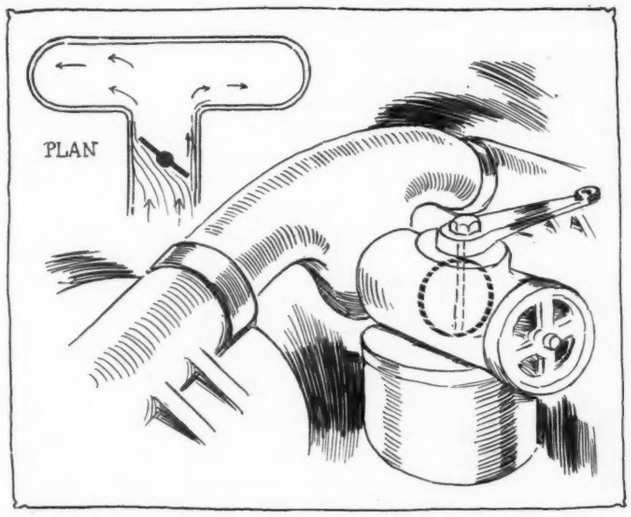


Fig. 2—The vertical location of the butterfly valve sends most of the gas to one cylinder. The valve should be horizontal to feed both cylinders equally

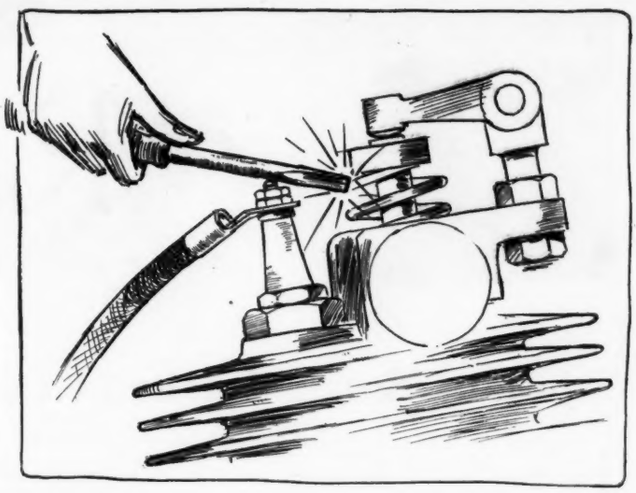


Fig. 3—To study each cylinder separately, cut out the spark of one by shorting the plug with a screwdriver

and had his car under control, they gave judgment in favor of the parents. The car owner appealed and the judgment was reversed, the Court saying that, as the chauffeur was without fault and the only duty resting on him was in good faith to make the best available use of his opportunities and skill to avoid injuring others, the accident could not be attributed to him.—*Paul vs. Clark*, 145 *N. Y. S.*, 985.

Frightened Mules, Motorist Pays

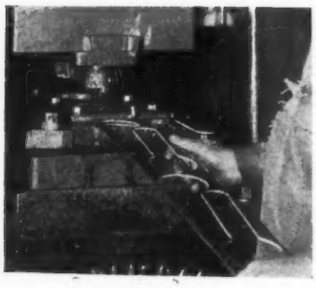
A Texas court says it is the duty of a motorist to stop when he sees a team of mules have become frightened at his approach.

In this case a motorist was going north on a public road. As he approached a road going east and west, a team of mules, which had been just unhitched from a grader, was met at the crossing. The mules were standing at the side of the road and, as the auto came along, they showed signs of being frightened. The motorist did not stop however, but increased his speed and also increased the noise of the car. The mules ran away and were injured. Their owner sued for the injuries to the mules and the Court allowed the owner to recover the amount the mules were injured, holding that where a motorist increases his speed and the noise of his car, after he sees a team of mules has become frightened, he is liable for damages if they run away and injure themselves, especially if the car makes "a terrible noise," as witnesses testified this particular car did.—*Carsey vs. Hawkins*, 163 *S. W.* (*Texas*) 586.

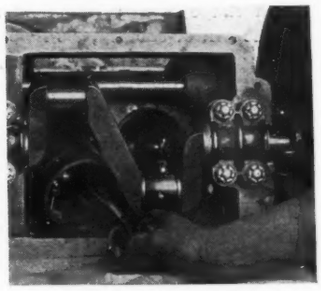
Evidence When Cars Collide

New York court says that, as the testimony of a motorist, whose car was injured in a collision with another car, was entirely irreconcilable with the physical facts of the position in which the two cars were found after the accident, it was evident that the motorist who claimed damages was not entitled to them.

Two cars came together at a fork in a road; the occupants of one of the cars testified that their car was going at 7 miles an hour, and the other car was going 35 miles an hour, on the wrong side of the road, with no lamps lit. The occupants of the other car claimed that the first car, which was coming in an opposite direction, swerved and struck the left hind wheel. At any rate, immediately after the accident, the first car was found damaged in front and on the left side, while the second car was injured only about the rear wheel. The claim for damages made by the the owner of the car which was damaged in front and on the side was therefore denied.—*Sacman vs. Young*, 145 *N. Y. S.* (*New York*) 1089.



The Rostrum



Many Small Details in Car Design Can Be Improved

The Editor of THE AUTOMOBILE *would like to hear other readers' views on this subject. The question of the improvement of the modern car is both interesting and important, and as this reader suggests, a discussion of this sort should prove of value to both manufacturer and user.*

EDITOR THE AUTOMOBILE:—I would like to see a discussion in the Rostrum of the suitability of the modern car to the average owner, in other words, let the readers of THE AUTOMOBILE give their ideas on the features in the cars they own that they like and on the other hand criticize those that do not meet their approval.

It seems to me that THE AUTOMOBILE should be a very good medium for bridging the gap between manufacturer and user and that the ideas expressed in these columns would be a valuable guide to the manufacturer in designing new models as it would show him possible improvements.

A discussion along these lines would also be of value to the prospective purchaser, whether he be a veteran motorist or a novice. It would show him the features in construction to avoid and those not to avoid. It would broaden his knowledge of the desirability of various car features without the expense of finding them out by painful experience.

Details Can Be Improved

To start this discussion off, I am going to give a few of my own experiences. My car is just 1 year old now and in that time I have made a very careful study of its characteristics and I find that there are a number of small details that might be improved without appreciably raising the cost of manufacture, yet these changes would make the use of the car more pleasant and, might, in some cases, change the purchaser of one of them from a knocker to a booster.

The first thing that came to my attention after receiving my machine was the inconvenience of the accelerator pedal, it being located right between the clutch and brake pedals and so close to them that whenever I would remove my foot from the accelerator quickly, to apply the brake, I would catch my toe on the under side of the pedal. The central position of the pedal also required that I assume a cramped position; instead of sitting straight, I had to sit sideways.

Accelerator Position Changed

I soon got tired of this and determined to change that pedal so that I could assume a normal position when driving, and therefore I thought out a little scheme whereby I could operate the pedal from a position considerably to the right of the brake, as well as in the center. I did this by fitting an ordinary brass accelerator pedal, which I bought at a supply store, to the floor boards, in the right location, that is, the pins on which the two pedals were pivoted were placed on a straight line. Then I removed the two pedals from their respective brackets, reamed out the holes in which the pivoting pins were placed until they were 1-4-inch in diameter, drilled a 3-32-inch hole in the hub of each pedal and registering holes in a new shaft which was about 1-4-inch in diameter. After this was done I put the shaft and pedals in place and fastened the pedals to the shaft by means of cotter pins. With this arrangement the two pedals move as one and I can use the one that suits me best, and this is nearly always the outside one, as I use the center one only for resting myself for a few minutes, after driving for a long time with the outside pedal.

The next thing that engaged my attention was the location of the grease cups on the front ends of the rear springs, there being so little clearance between the cup caps and the brake rods that it was impossible to remove one cap at all and the other could be taken off only with great difficulty. I put off the filling of these cups as long as I dared, which was nearly two months, and then I was forced to loosen up the brake rods, take off the cups and put in short pieces of brass pipe to make the cups accessible.

About this time I had my first puncture, but although I had demountable rims, it took me over an hour to put on a new tire and tube. The difficulty was that the rim would stick when about half-way on and would not go further, without a great deal of coaxing. I thought that my ignorance was the cause of this delay so I went to the nearest agent and asked him for instruction on putting on this type of rim. He showed me, and it seemed simple enough on the model which was in the show room, as he took the rim off and replaced it in about 20 seconds. The rim, by the way was a type where only one nut needed to be loosened. However, just to be on the safe side I invited him out to repeat this feat of speed on the rim that gave me trouble. It came off all right but when he undertook to put it back on, the rim stuck and it took an endless amount of hammering before he could get it into place. Since then, I have found out that a great many of these rims, as well as others that are supposed to save delays, give trouble in actual service. Why, I would like to ask, did not the manufacturer of this car take the pains to test out these rims thoroughly before he signed up? It is a little thing that would have saved a lot of trouble and prevented the ruining of many tempers.

Foot Pump Unsatisfactory

Another little feature that caused great annoyance, was the cheap pump that came with the car, it leaked from the day it was first used. The washers and hose were replaced frequently and yet it never has given the service that I know I am entitled to expect of it. Foot pumps with leather

washers are a very great mistake in my humble opinion.

After I had my car about 6 months I hired a chauffeur, and I made the mistake of getting a cheap one, a policy which I found to be false from a standpoint of economy. However, I am getting away from my story. This chauffeur had the bad habit of dipping a handful of cotton waste into the fuel tank every time he wanted gasoline for cleaning purposes. About the time he left I noticed that the car did not run properly. I took it to a repairman. He tested it and diagnosed the trouble as dirt in the gasoline line. A little inspection showed that the tank outlet was clogged with waste. As the outlet was on the opposite side from the filler opening it was next to impossible to get at it. To insure myself in case I should have any more trouble of this kind I had another opening made right over the fuel outlet. I cannot understand why manufacturers will overlook a simple point like this one, as I have found since that this hole has saved me much trouble, as I have been able to keep the tank clean without difficutly.

One other point, that goes to show how careless a manufacturer can be is the absence of priming cups on my car. It would have cost little or nothing to fit these, yet they would have saved all kinds of trouble on cold mornings. This is false economy in my opinion.

These few points will serve to illustrate my ideas and although I could mention many more I am afraid I have taken up too much of your valuable space already. I hope that these suggestions will start a discussion that will prove of value to both car owners and manufacturers.

New York City ROBERT F. CHAPMAN.

Cylinders Should Be ¼-Inch Thick

Editor THE AUTOMOBILE:—1—What is the correct thickness of the walls of a cylinder 4 inches in diameter?

2—What is the best shape of combustion chamber?

3—What is the necessary water-jacketing space for a high speed six-cylinder engine?

4—Do rotary and sleeve valves take more power to drive than poppet valves? If so, explain why.

5—How can a compression of 60 pounds pressure be increased to 80 pounds pressure.

Plainfield, N. J. C. D.

—1—One-quarter of an inch is considered good practice.

2—This is a matter of opinion. Some designers favor one construction and others another, but there is no way of determining which construction is best because one may be preferable under certain conditions while another will be better under other circumstances.

3—The amount of water-jacketing space to allow depends on the ability of the pump to circulate the water and on the tendency of air pockets to form. Since it is the film of water next to the cylinder wall that absorbs the heat conducted to it, providing this film can be maintained, cooling will be just as effective whether the space is 1-8 of an inch or 1 inch. It is difficult to circulate the water, however, if the space is too small and there is also danger of air or steam pockets forming, therefore make the space .5 to .75-inch.

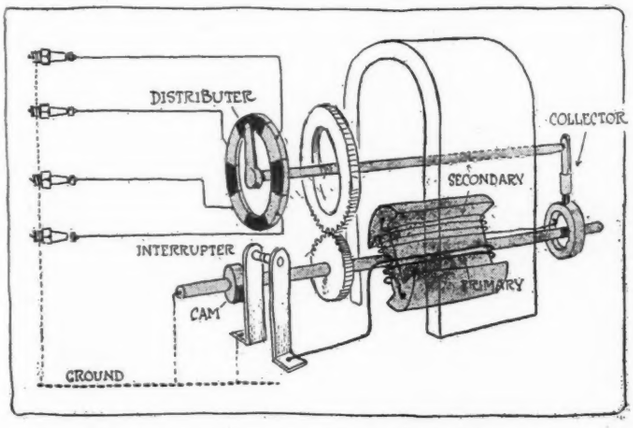


Fig. 1—Skeleton diagram of high-tension magneto system. The primary or low-tension winding of the coil is the armature winding and the current is generated in it. The high-tension winding is wrapped around the low-tension coil

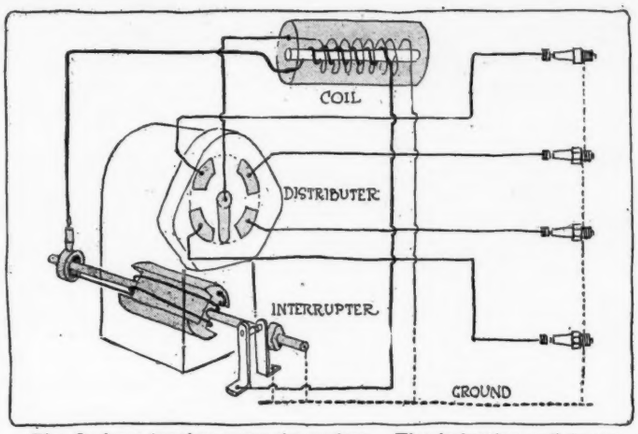


Fig. 2—Low-tension magneto system. The induction coil is separate from the armature winding and their functions are distinct, the former raising the voltage of the current that is generated in the latter

4—Rotary valves take less power than the poppet type, Whether the sleeve valve also requires less to drive it we are unable to say because this has never been determined by tests.

5—Changing the compression to 80 pounds means that the volume of the combustion chamber must be reduced 15 per cent. This can be done by bringing the pistons further up into the cylinder heads by fitting longer connecting-rods, or by attaching plates to the tops of the pistons. Both methods have their difficulties, and it is best not to raise the compression unless you are certain that you will gain something by it.

Difference Between Low and High-Tension Magneto

Editor THE AUTOMOBILE:—Will you kindly explain the difference between a low and high-tension magneto and how they can be distinguished?

Akron, O. A READER.

—The difference between the low- and high-tension magneto is in the position of the induction coil. In the former the coil is a separate unit, while in the latter the coil is located on the armature, the primary or low-tension winding having the current generated in it.

The two types of magnetos are shown in Figs. 1 and 2. They can generally be told apart because the low-tension design requires an exterior coil while the high-tension does not. This does not apply, however, when a dual system is used because the high-tension design then has an exterior coil for stepping up the battery current. In this case it is difficult, without tracing the various wires out carefully, to determine whether the system is a low- or high-tension construction.

Spark Plugs in Series on Cadillac

Editor THE AUTOMOBILE:—Will a Cadillac motor produce any more power if the spark plugs are connected in series?

Springfield, Mass. G. H. STIBBS.

—Two-point ignition will make no difference in the power output of a Cadillac motor because both plugs would be located on the same side of the cylinder, since an L-head construction is used. Therefore they must be the same distance away from the main part of the combustion chamber.

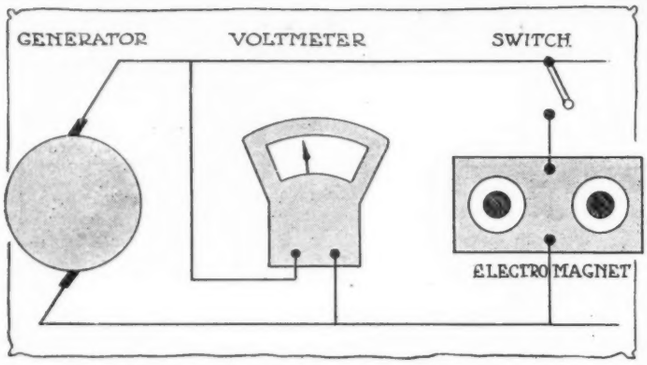


Fig. 3—Wiring diagram for connecting up magnet recharging apparatus to a 110-volt generator

These plugs would not increase the power, because they would not increase the speed of combustion due to both plugs igniting the charge at about the same point, at the same time. If the plugs were situated on opposite sides of the cylinders so that the charge could be set afire simultaneously at opposite points then the combustion would take place from the edges to the center and would occupy half the time necessary when the charge is ignited at one edge and must burn from there all across the combustion chamber to the opposite edge.

When Magnets Should Be Recharged

Editor THE AUTOMOBILE:—

1. Will you please explain how to ascertain when a magneto needs magnetizing?

2. I have a direct-current Westinghouse generator, 110 volts, 3.75 kilowatts. Would it be possible to remagnetize a magneto with this machine? If so, kindly explain how to connect up by diagram.

3. Will you please give a description of the Delco electric starter and lighting system which is used on the Buick?

While overhauling a car for a friend I had an experience which I thought perhaps may be interesting to some brother reader, though I do not suppose it is anything new for the average mechanic. However, I will explain it as well as possible, and if you see fit to publish it you may do so.

This car was an Overland 30 and, I think, 1912 model. It was giving considerable trouble; would run hot; could hardly pull the car on high gear. I fitted in new rings, ground the valves and adjusted all the tappet rods.

That helped matters considerably, but still the engine did not develop full power, so I went through it again and found that the timing on the valves was rather late, due to a worn timing gear, so I made an offset key and removed the straight key which was holding the gear in position, and I shifted the gear on the shaft about 1/32 inch in the opposite direction from which it runs and drove in the offset key, which now holds the gear in the new position on its camshaft.

This has advanced the camshaft enough so as to cause the inlet valve to open at approximately 8 degrees after top center and close about 38 degrees after bottom center. The exhaust opens at 46 degrees before bottom center and closes at about 15 degrees after top center, and now the owner claims that it runs practically as good as when it was new, and it does not run warm and seems to be developing full power.

Beaumont, Texas. THEO. PLACETTE.

—1—When the magnets become weak and need remagnetizing the motor will miss when running at slow speeds. After the breaker points and the spark gaps have been adjusted it is safe to assume that the missing of the engine is caused by weak magnets.

2—The wiring diagram to follow in connecting up your generator to an electro-magnet for recharging magneto magnets is shown in Fig. 3. The electro-magnet is simply connected across the terminals of the generator. A voltmeter should also be attached as shown and the voltage should be kept somewhere near 110 by maintaining the speed of the machine at its rated value, and if necessary by adjusting the field resistance. If you use the electro-magnet that was described in the March 25 issue of THE AUTOMOBILE no resistance will be required.

Delco System—A Single Unit

3—The Delco system used on the Buick is a single-unit system; that is, motor and generator are one machine, the same frame and armature core being used. The motor and generator circuits are entirely separate, the field windings and armature windings of the two being distinct. The single wire system is used, which means that the engine and frame make up one side of the circuit.

When operating as a motor the machine drives through the flywheel, and when running as a generator it is driven from the pump shaft. Referring to Fig. 4 it will be noted that on one end of the armature is a train of spur gear pinions that can be meshed with teeth cut in the flywheel, and the other end of the armature shaft is driven from an extension of the pump shaft.

When the starter is operated the pair of gears A B are moved to the left until the gear A meshes with the flywheel and the gear B with the pinion on the motor armature. An over-running clutch is installed in B so that when the engine starts running it cannot drive the starter.

When the unit is generating current for charging the battery or for lights or ignition it is driven at crankshaft speed by the pump shaft. An over-running clutch is also provided on this end because the unit operates much faster than this when acting as a motor.

Single Rod Controls Gear and Switch

The starting gears and switch are controlled by the movement of the rod C, Fig. 4, the switch being shown in detail in Fig. 5. When the starting lever is pushed down the rod C is pulled back, closing the contact E, which completes the circuit between the storage battery and the generator armature, the generator acting as a motor for the moment. This causes the armature to rotate slowly so that the gears can be meshed without difficulty. As the starting lever is pushed down further the contacts F are opened, breaking the circuit between the storage battery and the generator armature. At the same time the motor brush switch, Fig. 6 is brought into contact with the motor commutator, and this completes the circuit and the motor starts turning the engine over.

A wiring diagram of the Delco system is given in Fig. 7, and the starting switch is shown in the upper left corner. The contact points are indicated by the letters used in Fig. 5.

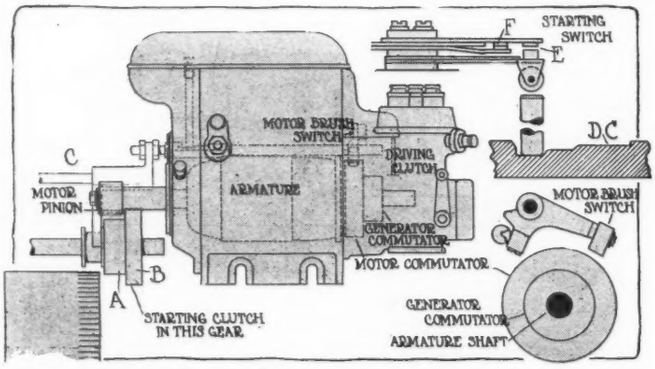


Fig. 4—Left: Delco motor-generator showing starter gearing to flywheel

Fig. 5—Upper right corner: Starting switch

Fig. 6—Lower right corner: Motor brush switch

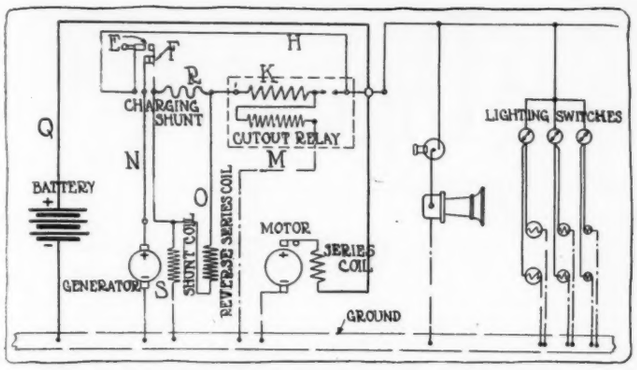


Fig. 7—Wiring diagram of Delco system as installed on Buick

When the starting pedal is depressed the contacts E are closed and current flows from the storage battery through the wires Q and H, and then through the generator winding and shunt field coil to the frame through the two ground wires. As has already been noted, this causes the armature to rotate slowly and then the gears connecting with the flywheel are meshed. Further movement breaks the contact F. As soon as the brushes are brought down on the commutator of the motor armature current flows directly through the motor winding and its field, the path being through the wire Q, the series field and armature of the motor to the car frame and from thence back to the battery.

Current for lighting and ignition is supplied by the storage battery, when the speed of the generator is too low for it to produce sufficient voltage. When the generator speed drops to the point at which its voltage is below that of the battery the circuit between generator and battery is automatically broken by a device known as a cutout relay. If the cutout relay were not fitted the battery would discharge itself by operating the generator as a motor.

The cutout relay is an electro-magnet with a compound winding, the voltage coil or fine winding being connected directly across the terminals of the generator, while the current coil or coarse winding is in series between the generator and the storage battery. The former is shown at K and the latter at M, Fig. 7.

Cutout Closes Circuit at 6 Volts

When the engine is started the voltage builds up until it reaches about 6 volts, when the current passing through the voltage winding produces a magnetic attraction great enough to close the contacts on the cutout, by pulling the magnet armature to the core against the tension of spring. The current flowing through the coarse winding increases the pull on this armature and helps to hold the contacts tight.

When the generator slows down and the voltage drops below that of the storage battery the battery sends a reverse current through the coarse windings, which produces a magnetic field of opposite polarity to that maintained by the current in the voltage winding, and the former neutralizes the latter so that the attraction on the magnet armature is killed and the spring breaks the contacts.

The path of the current when the generator is charging the battery is from the positive terminal of the generator through wires N, O, K and Q, and from thence to the frame back to the negative terminal of the generator.

Part of the current, instead of flowing through O, goes through the charging shunt, and a small amount of current also runs through the shunt field S, instead of to the storage battery.

The voltage is regulated by means of the reverse series field coil, the magnetic force produced by this coil opposing that of the shunt field; therefore, as the speed of the machine increases, instead of the net field strength increasing proportionately, it remains nearly constant. The voltage depends directly on the strength of the field.

The lights and horn are connected directly across the line, between the generator and the battery, a switch controlling each pair of lights.

Whether Detached H-T Wire Is Grounded

Editor THE AUTOMOBILE:—I am using a Brown impulse tire pump in connection with the Brown detachable spark plug on my Buick model 37 B. In attaching the pump is it necessary to detach wire from plug?

Kindly inform me if the wire should be grounded or left with terminal in space when the pump is being driven by the power of the remaining three cylinders.

What result would detaching the wire without grounding have on the system mentioned, it being understood, of course, that the engine is in motion at this time?

New York City. W. J. GANO.

—It makes very little difference whether you ground the detached wire or not. If the wire is not grounded the current that would have passed through it jumps across the spark gap. The only possible objection to allowing this to happen is that it might, in time, wear, burn down the spark gap points and thus increase the gap. This objection is not very great, however, because the pump would have to be operated a long while before this would occur and the length of time required to fill a tire is very short, as a rule.

How Two-Cylinder Camshaft Works

Editor THE AUTOMOBILE:—I wish you would explain by sketch and description the working of a camshaft of a two-cylinder horizontal motor.

Bronx, N. Y. W. H. C.

—The operation of the camshaft on a two-cylinder horizontal motor is similar to that of the common four-cylinder vertical type, the only difference being a change in the position of the various parts.

As indicated by the illustration, Fig. 8, the valve is opened and closed by the rotation of the cam A, which actuates the push-rod B and the valve C. The push-rod slides in a guide in the crankcase and the valve stem slides in a guide in the cylinder casting. The valve is held closed by the spring D.

The camshaft is rotated at half engine speed by the gears shown. About the only difference between this valve construction and that employed on a four-cylinder, vertical motor is that the upper end of the push-rod is offset to meet the lower end of the valve stem.

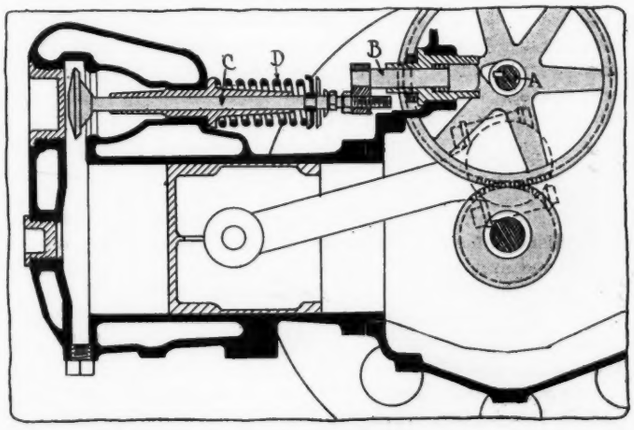


Fig 8—Illustration of two-cylinder motor showing operation of camshaft. The valve C is actuated by cam A through push-rod B. Spring D holds valve closed

The Engineering Digest

The Week's Grist of Technical News from Europe

Time Saved by Using Flame with Surplus Carbon for Casehardening

IMPORTANT tests have been made by O. Barsch-Olichschlager of Berlin to determine what influence the nature of the flame and of the heating-method has upon the casehardening process. They were occasioned by the observation that in practice different results are obtained in different ovens, although temperatures and all other factors are maintained alike. The main question was what would be the influence of a surplus of oxygen in the flame and what, on the other hand, that of a flame in which there is no uncombined oxygen and therefore a surplus of carbon.

Oil-heated ovens were chosen for the experiments, as a surplus of carbon is particularly noticeable in the oil flame and can be regulated at will. The ovens were equipped with high-pressure blowers to supply air to the burners. At the burner in each oven a slide-damper was provided by which natural draft could be entirely excluded. Each had a galvanometer to measure temperatures. The oven space was 16 x 13 x 12 inches (400 x 325 x 300 millimeters). The "Lavaoid" casehardening compound was used, because it is not merely a mixture of different ingredients but a preparation in which each grain of charcoal, 2 millimeters in size, is coated with carbonate of barium mixed with certain other substances. By this provision uniformity in action is secured, while the carbon is protected against contact with free oxygen by the coating and the carbon monoxide gas is compelled to enrich itself with nitrogen, by breaking out through the barium, before it reaches the work. The specific gravity of the fresh compound is .45.

For material to be casehardened drawn round rods 5 1-2 millimeters in diameter and with .2 per cent. carbon content were used. They were cut into lengths of 250 millimeters. At each test 40 of these pieces, weighing 1.94 kilograms, were placed in a wrought-iron box 300 millimeters long, 225 millimeters broad and 90 millimeters high and were packed so that there was an interval of 20 to 25 millimeters between the pieces, as well as between the pieces and the walls and cover of the box. The casehardening compound was tamped down very slightly. The box was placed in the oven on rollers, so that it could be entirely surrounded by the flame. The cover was first carefully puttied to the box with wet clay.

First Test: With Surplus Carbon in Flame

Excess of carbon is indicated, when the oven is closed, by a reddish lambent flame from the flue. Within the oven a smoky red and yellow flame whirls around. The forced draft had a tension of 1,200 millimeters water column (1 1-5 atmosphere). The slide-damper at the burner was completely closed, so that no other air than that which arrived through the burner got into the oven.

The oven was heated to 820 degrees centigrade. This dropped to 700 degrees when the box was put into it, but in 45 minutes the temperature of 820 degrees was again reached and was thereafter maintained uniformly for 3 hours, the galvanometer readings being taken every 15 minutes.

Thereafter the contents of the box were cooled in the atmosphere and the rods were heated again to 820 degrees and quenched in water. All of them, when fractured, showed a casehardening shell 1 1-2 millimeters thick. The consumption of oil for the three hours at 820 degrees amounted to 4.64 kilograms of "Parellin," having a heat value of about 9,650 heat units. The forced draft consumed 3 amperes. The specific gravity of the casehardening compound after the test was .48.

Second Test: With Surplus Oxygen in Flame

The surplus of oxygen is indicated by the invisibility of the flame. The slide-damper at the burner was wide-open and admitted plenty of air in addition to that coming through the burner. The air valve of the burner was also wide-open, and the air pressure reached 2,500 millimeters water column.

The initial heat was, as before, 820 degrees, which went down to 740 degrees upon the introduction of the box. After the temperature of 820 degrees had been regained it was again maintained uniformly for 3 hours. After cooling the contents of the box in the atmosphere, reheating and quenching, the thickness of the hardened shell was found to be uniformly .7 millimeter. The fuel consumption during the 3 hours amounted to 3.36 kilograms of "Parellin." The draft required 4 amperes. The specific gravity of the compound had risen to .54.

The conclusions were as follows:

Efficiency

The effect is twice as great with a flame rich in carbon as with one having no free carbon. A given depth of hardening can be obtained with a flame rich in carbon in not more than half the time required when a clear flame with excess of oxygen is used; considering the decreasing penetration as the thickness of the shell increases, the gain is probably even greater.

Fuel Consumption

As 4.64 kilograms of the oil produced twice as great a thickness of shell with the flame rich in carbon as 3.36 kilograms produced with the other kind of flame, at least 6.72 kilograms, and probably much more, would have been needed to produce equal results with the latter. A saving of 45 per cent. in favor of the smoky flame is thus recorded, but it is probable that this saving may be considerably increased in practice, as the excess of carbon was purposely made very high at the test in order to remove doubts.

Power Required for Draft

Considering the results in the two cases, the use of 4 amperes for the poorer results and 3 amperes for the better ones is of course also in favor of the flame rich in carbon, but the matter is of smaller importance than that of the fuel consumption.

Specific Gravity of Compound

The increase in specific gravity means consumption of the casehardening compound. This increase was more pronounced for the poorer results than for the better. Under

the conditions of the tests and considering that 80 per cent. of the Lavaoid compound can be gasified and used, the difference in consumption in the two cases is figured out to amount to 1-6 of the total of compound employed, in favor of the flame rich in carbon.—From *Der Motorwagen*, March 10.

Some Reservations

[As the report of these tests is likely to go the round of the technical press, an unscientific omission in it may here be noted. No details are given with regard to the boxes of wrought iron in which the casehardening work was packed. Yet, as the boxes are closed and the flame playing on their outsides only, the whole process is one in which the nature of the box must be a very important element, on the supposition that the nature of the flame, and not the temperature and its duration only, influences the results. It is not stated that the boxes in both cases were smeared or were not smeared with clay on their entire inside walls, nor that one or the other of the boxes had been used or had not been used before, nor that one or the other of the boxes absorbed or did not absorb carbon during the process. It is conceivable that the box used with the flame having a surplus of oxygen was strongly carburized and that the other box was less or not at all affected in this respect. The gases developed in the boxes might penetrate the wrought iron much more readily if this wrought iron had never been exposed to carburization before and more readily in a direction toward a flame rich in oxygen than toward one rich in carbon. These details should plainly be settled by new tests before the results accepted by Mr. Barsch-Olichschlager may be written down to the credit of oil-heated ovens as against other types and in favor of a smoky flame as against a clear one. The "certain other substances" in Lavaoid compound should perhaps also be known. Withal, the tests signify a long step, however, toward clearing up some of the more mysterious factors in casehardening work.—ED.]

Results of Prussian Prize Contest for Two-Fuel Carbureters

WITH a view to the encouragement of the use of benzol for motor vehicles, a prize contest for carbureters was held under the auspices of the Prussian war department in February. The results have now been made public, in part. The first and second prizes, amounting to 10,000 and 5,000 mark, respectively, were pooled and divided evenly between the makers of the Pallas and of the Zenith carbureters. The third prize of 3,000 mark was awarded for the Farewell carbureter, made at the Prerauer & Heinrich automobile components works in Berlin, and the fourth prize of 2,000 mark to the Adler automobile works at Frankfurt-am-Main for the Adler carbureter. Other carbureters in the contest were the Daimler, the N. A. G., the Opel, the Bucherer-Inhalator, the Favorit, the Gobbi, the Maxwell, the Ungarische Staatsbahn, the Momico-Mixers, the Stewart. The Pallas carbureter is made by the Pallas carbureter company of Berlin-Charlottenburg and the Zenith under the French Zenith patents by Zenith carbureter company of Berlin-Halensee. As usual in similar cases, discontentment with the awards seems unanimous among the losers.

According to the rules, the prizes were to be awarded for the carbureters which combined with the simplest and most durable construction the most economical and most nearly smokeless operation with benzol as the fuel, started the motor most readily from cold and could be quickly adjusted to operation with gasoline.

The tests were made partly on the road and partly on the test stand, and those held on the road are considered the most important by motorists, because the evaporation of benzol offers special difficulties under the changeable temperature and weather conditions there encountered.

The benzol used was that usually sold for use in winter, having a specific gravity of .880. At least 50 per cent. of it must boil at 100 degrees centigrade, while at 140 degrees it must evaporate completely.

The different carbureters were tried on the road in different motors and vehicles, but the judges were enjoined to keep the merits of the carbureters distinct from those of the motors. None but poppet-valve motors were admitted. Injection of fuel before starting was prohibited. The motor bonnets, the fuel tanks and the radiator caps were sealed. All lubrication and replenishments had to be arranged to be done from the outside of the bonnet, and provisions were also made for priming the float chambers from outside of the bonnet. The test circuit was 1,300 kilometers long, beginning and ending in Berlin. The gasoline used was of specific gravity .720 to .726.

Features of the Winners

In the Pallas carbureter the main jet comes up centrally through the float chamber (as in several American carbureters), so that the fuel level in the jet is not influenced if the carbureter is tipped to one side or another or by swashing of the liquid. The jet passes obliquely through the air conduit, as shown in Fig. 1. It consists of a main and an auxiliary jet, the latter being connected with a small auxiliary fuel container. This is emptied by the further opening of the throttle and afterwards it admits additional air through calibrated holes to the auxiliary fuel jet. All these parts are threaded together to form one part which can easily be withdrawn from the outside. At still-running, with the throttle closed, the auxiliary jet supplies the fuel needed. The main air channel is provided with an elbow which can be turned, so as to draw the air either from the heated portions of the motor or from the cold atmosphere and from any desired direction, as it may be desirable, the direction of the wind and the speed of the vehicle being considered.

The Zenith carbureter was of the well-known Zenith type, and no variations in its construction for purposes of the test are mentioned.

The Farewell carbureter is made under Longuemare license. It has two jets and, like the Pallas, has a provision for admitting air to the fuel conduit. The two jets are concentric, but not of equal length, and are both connected with the float chamber. Adjacently to them there is a small fuel reservoir connected on one side with the atmosphere and also by means of calibrated holes with the auxiliary jet; it is always filled when the motor runs idle and the throttle is closed and is emptied by the opening of the throttle, whereafter air enters by way of it, instead of fuel. The main jet rises through the middle of the main air channel, which is designed on the injector plan, and its mouth is above the narrowest place in the channel.

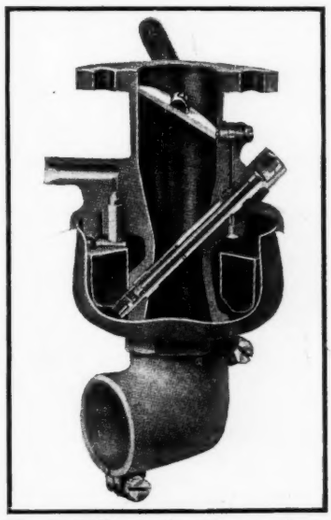


Fig. 1—Pallas carbureter, a winner in Prussian contest

In the Adler carbureter an automatic spring-actuated mushroom valve takes care of the addi-

tional air. It is prevented from operating abruptly by means of a hydraulic brake device. The main jet rises in a long air channel at the upper end of which the additional air enters. Over the mouth of the jet there is a hood on which the least volatile constituents of the fuel are precipitated, while a groove on the hood leads any surplus toward the air current. Aside from the main carbureter there is a small auxiliary carbureter with a tubular fuel container receiving its supply through an adjustable hole which lies below the float chamber level. At the top the container is connected with the air channel in the vicinity of the throttle valve.—From *Allgemeine Automobil-Zeitung*, March 21.

[Similar cursory descriptions, in most cases illustrated but not very conclusive on the points relating to the use for either of the two fuels, are also given of the other carbureters in the contest. It is expected, however, that more complete accounts will appear later. The feature of admitting air to the fuel jet or jets is widely adopted.—ED.]

Carbureter Combining Most Recent Ideas on Design and Regulation

AN attempt to unite in one construction the most attractive features of other carbureters already in the market, while adding refinements and avoiding the need of auxiliary fuel-economizing devices, is noticed in the new French carbureter, the Piat. The principle of diluting the fuel with more or less air, according to the speed of the motor, has been abandoned in favor of the now more widely approved principle of making the suction current of air create eddies which more or less counteract the fuel feed—this principle presenting the important advantage over the earlier method that the transition periods from one motor speed to another, during which the speed for which correct regulation is wanted has not yet been realized, are more rationally taken care of. As, however, the piston speed remains an important factor in determining the nature and path of the suction current, the principle can only be applied by compromise. It is believed that it was first, though not quite successfully, applied by Dunlop, the inventor of the pneumatic tire—at or about 1903—but was relegated to the background through the prestige of the Krebs improvement and the subsequent gradual elimination of movable parts, though the total absence of movable parts was one of the features of the Dunlop carbureter also.

The jet design in the Piat seems to be patterned somewhat upon the ideas incorporated in the Gobbi and the Stewart carbureters. As in the latter and an increasing number of other recent designs, the float chamber is disposed annularly around the air channel and the jet, instead of to one side.

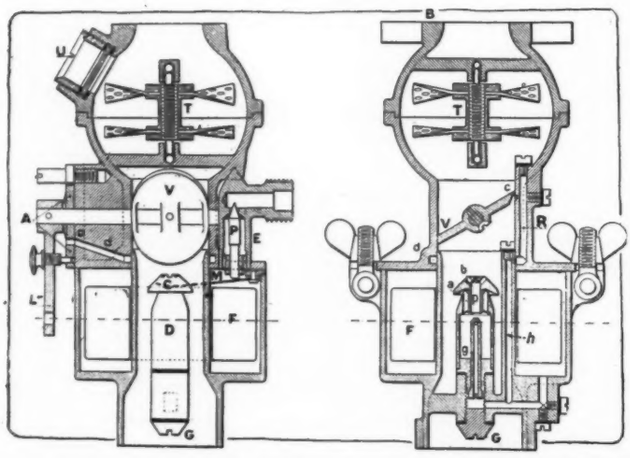


Fig. 2—Vertical sections of Piat carbureter, a construction without variation of air intake ports

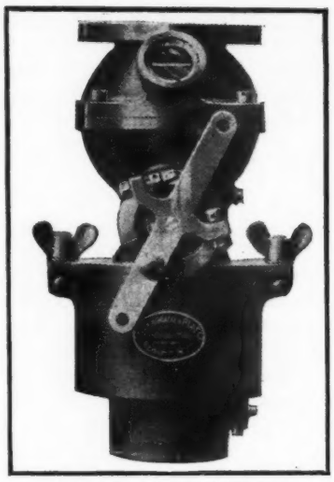


Fig. 3—Piat carbureter

The construction is shown in the two sectional views of Fig. 2. The jet stands within a cylinder which is perforated vertically at the top and crowned with a hat shaped as a lamp shade, also perforated. When air is drawn into the carbureter at low speed, the gases inclosed in the jet-housing and its upper perforations act as a cushion barring the entrance of air under the hat, and a relatively rich mixture is drawn out in a direct path from the jet through the central and other apertures of the hat. This is so much more the case as with the throttle valve partially closed the air current follows a path close to the circumference of the air channel where the hat is not in the way. When it is desired to increase the motor speed and the throttle is opened more widely, the current strikes more sharply along the edges of the hat and forces eddies toward the central perforation making the suction at the mouth of the jet relatively smaller; that is, smaller than unobstructed air at the same speed would make it. It depends of course upon the empiric adjustment of all the parts whether the adjustment of fuel and air accomplished by this means becomes really suitable.

Smart Device for Still-Running

Special provisions are made for starting and still-running. From the conduit between the float chamber and the jet a branch channel *h* connects with a circular groove *d* formed between the central and the lower portions of the structure, and from this groove another conduit R rises vertically communicating with the interior of the carbureter by a small hole *c* bored exactly where the sharpened edge of the throttle valve touches the wall when the throttle is closed. Under this condition, atmospheric pressure causes a jet of pure gasoline from hole *c*. It is hurled against the edge of the butterfly valve. If there were no other provision, the fuel would always come undiluted through hole *c* and much would be wasted. But the annular groove *d* can be placed in communication with the atmosphere by means of valve disk A mounted upon the throttle lever. When the latter is opened, the disk uncovers an opening which permits air to enter in groove *d*. At still-running this opening is almost covered and very little air enters, mixing with the jet of gasoline. As it is opened more and more, the pressure in *d* finally becomes equal to atmospheric, while the suction through R is reduced, and the gasoline ceases to flow out at *c*. This corresponds to normal running.

Churning the Mixture

In a spherical enlargement of the air channel above the throttle valve two mixer-fans of opposite pitch serve to perfect the gas mixture and hurling all unevaporated particles of the fuel against the edges of perforations in the fan blades and against the carbureter wall. Their action can be observed through a glass sight U. The upper fan has four blades and the lower one only two, and both are secured on the same shaft, the latter mounted between an upper and a lower steel ball. As the suction acts more strongly on the four-bladed fan than on the one with two blades, the latter is compelled to follow the direction given it, and its opposite pitch thus accomplishes the desired churning of the mixture.

In the matter of convenience to the user, the drawings show plainly how readily the construction may be taken apart and cleaned. Adaptation to motors of different size and design is provided, first by having four different sizes, secondly by furnishing four different jet-hats and three jets for each carbureter. The size of the hat determines the sectional area of the air channel, and the variation of it is more facile, from a manufacturing standpoint, than a variation of the narrow passage in a Venturi tube.—From *La Vie Automobile*, March 28.

Simplified Driving-Connection and Electric Control of Lubrication

IT is noticed in a description of the well-renowned Th. Schneider 14-16 horsepower cars (4-cylinder motor, 82.5 by 140 millimeters bore and stroke) that the driving connection from the wheels to the chassis is considerably simplified without engaging the springs to take the driving stresses. The springs are shackled both in front and rear, and the torsion tube, within which the drive shaft is housed, does not reach quite to the front universal but is mounted a few inches to the rear of it upon the drive shaft itself by means of a large thrust ball-bearing and a smaller radial ball-bearing, and the driving-thrust is taken farther by the short remaining end of the shaft to the very generously dimensioned universal. Whatever portion of the thrust may be transmitted further to the secondary gear shaft is also here absorbed in an end-thrust bearing. The drive shaft thus acts as both radius and thrust rod, and all longitudinal movement in the universal is dispensed with. Several joints are saved which in the usual construction do not always operate quite without conflict, and the universal is made more accessible as well as easily demountable. The primary gear shaft, by the way, runs within the secondary shaft for the entire length of the gearbox.

Schneider Lubricating System

In the same car the construction is observed which is shown in Fig. 4. Each crankpin is counterweighted to perfect the balancing and avoid vibrations and noise from shafts and camgears, though the normal speed is given as only 1,500 revolutions per minute, as now held to be necessary from any point of view for speedy long-stroke motors (see review of article by Lehmbeck in THE AUTOMOBILE of last week).

The lubricating system is composed, as shown in the illustration, of the following parts. A is the pump driven from gear B. C is the filter, D the branch tube to the pressure gauge. To the right is shown the mechanism of an electric control of the lubricating system. Aa is a contact taking current from the ignition circuit, B the head of a float, *b* a contact on the float by means of which the ignition circuit is grounded at C when the level of the oil in the crankcase goes below quotum. The motor is then automatically stopped for lack of ignition.

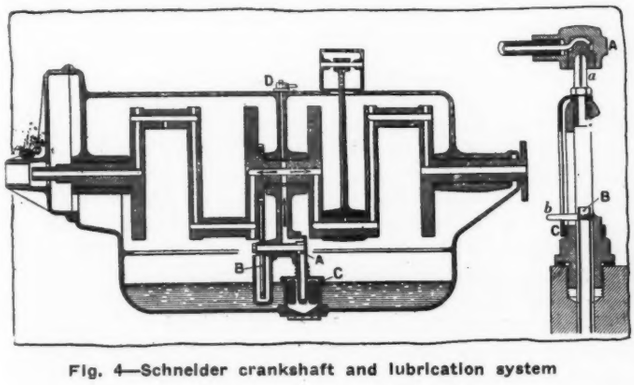


Fig. 4—Schneider crankshaft and lubrication system

Constructive Trend for Small and Light Cars in Germany

LIGHT cars in Germany are defined as those of a power from 6 to 10 tax-horsepowers. With a high-speed motor of the most advanced or radical type, this means from 12 to 20 horsepowers for normal use and a reserve of 50 per cent. extra by working the motor to its limit. Perhaps the average maximum is 22 actual horsepowers. The small car —the *Kleinauto*—is a two-seated vehicle of less than 6 tax-horsepowers. It is generally admitted that important constructive improvements of these types have been compelled through the importation of American cars. Something like a boom for light cars is now being nursed. A summary of the tendencies in the design of these vehicles may be given as follows from an article on the same subject in *Allgemeine Automobil-Zeitung*, March 14.

Both the length of the stroke and the number of revolutions are increasing. The weight of the chassis is decreasing. The speed usually exceeds 60 kilometers per hour. Block castings are the rule. Only Bugatti and Horch use overhead camshaft. Knight motor is used for a 10-horsepower Mercedes and for 8-horsepower cars of the Loeb, the Horch and the Stoewer manufactures. These three firms get the motor from the English Daimler company. The use of silent chains for the motor gear-drives is not uncommon. Autogenous welding is making headway in connection with use of sheet steel for stiffening light frames under the motor, as in Hansa models. Thermo-siphon cooling is the rule. Sharp edges are disappearing from radiators. Nearly all the cars have four gear speeds, and great importance is attached to the finish of the gear teeth, with a view to silent operation. Leather-disk universals are coming into use; all other universals are incased. Mercedes, Mathis and Loeb have pressed-steel rear axles. Worm-drive is adopted by the Loeb firm and at the Hansa works. A reaction against 3-4 springs is setting in, under the lead of Mercedes and Benz who never adopted them. Some of the cars from 8 horsepowers up have electric starting and lighting equipments. Steel wheels, mostly of the wire spoke type for the light cars, are getting common. Pneumatic tires are fitted in larger sizes than formerly.

"Small cars," being always 2-seaters under the definition adopted for this type, do not follow uniform construction lines as closely as "light cars," because economy is less urgent in their case. They are not family vehicles but runabouts in whose design the builder's individual fancy plays a considerable part.

Against Wear and Warping of Measures

SINCE 1909 a machine for the testing of calipers has been in use at the National Physical Laboratory at Teddington, England. It was designed by P. E. Shaw of Manhove, Alliott & Co. of Nottingham. A new machine with electrical contacts, as well as mechanical ones, has now been devised by the same designer and has been installed instead of the old. It is believed to eliminate all uncertain human elements from the measuring process. *Electrotechnische Zeitung*, February 5, notes, however, that variations of temperature must be taken into account correctly in order to avoid all error and that the electrical platinum contacts must be kept scrupulously clean. A description of the machine is given. It serves for the verification of measuring instruments employed in the metal industries.

Engine Balancing

Part II—Factory Methods

Excerpt from a Paper by F. W. Lanchester, Member of the Council of the Institution of Automobile Engineers and Consulting Engineer for the Daimler Company

QUITE apart from the question of balancing in design and the theoretical aspect of the subject, it is necessary to devote some consideration to the actual carrying into effect of the intentions of the designer in the shops. It is useless to devote time and attention to the elimination of vibration on paper unless a reasonable degree of care be exercised in the course of manufacture to ensure the necessary degree of accuracy in the weights of reciprocating parts, the proper balance of rotating parts, etc. On the other hand, the author has of recent years had personal experience of balancing appliances which in practical use have proved an entire delusion, and we frequently hear talk of a degree of accuracy in weighing reciprocating parts, etc., that is quite beyond the requirements of the case.

It is useless, in the case of an ordinary four-cylinder engine, in which the unbalanced forces may run into half a ton or more, with a reversal of sine twice per revolution, to expect to obtain any advantage whatever by weighing pistons to within a quarter of an ounce or by whittling down connecting rod stampings to a similar degree of accuracy; such fastidious exactitude shows no sense of proportion.

Superexact Balancing of Four-Cylinder Futile

In one case, the author's experience not only illustrates the danger of putting a machine or appliance that requires special knowledge into the hands of an ordinary shop foreman or mechanic, but also incidentally shows the futility of superexact balancing where the ordinary four-cylinder engine is concerned. The circumstances were as follows: A bad case of synchronous vibration in connection with a four-cylinder car of a new type being under investigation, the author decided at the outset to make sure of his ground by personally testing the balance of all components; the flywheel had previously been balanced both statically and dynamically on a special machine of well-known type, it carried the proper view marks and showed evidence of both balancing processes. It was duly removed from the engine and personally tested for static balance by the author, when a defect of over 4 ounces in the rim was discovered. This was ultimately traced to the fact that the dynamic balancing machine was defective in principle, and although the static balancing had been quite properly carried out, the subsequent use of the dynamic balancing appliance had resulted in the static balancing being undone and the wheel being passed officially with the error mentioned. Incidentally, it may be stated that the defect in this machine appeared to be that the flywheel was mounted on a cup and peg support, which, owing to its angle of friction, allowed a certain ambiguity as to the axis of rotation. After some investigation the machine was condemned, and its use discontinued.

As an amusing sidelight on the subject the fact may be recorded that when the flywheel was put back with 4 ounces removed from the rim on one side to secure static balance, the vibration of the engine was not distinguishably better or worse! This is not the author's only experience in the same direction; the constitutional error of balance in a four-cylinder engine is so great as to entirely mask anything less than a missing piston.

Methods of Static Balancing

There are three alternative forms of support that may be adopted when mounting parts for static balancing. The wheel or part may be mounted in ordinary lathe centers, a mandrel being used if necessary; the centers require to be jarred by hammering in order to eliminate the static friction and render this method of support sufficiently sensitive to indicate small errors of balance. Another method is to roll the part (mounted on a mandrel in the case of a flywheel or similar part) on two parallel horizontal straight edges mounted on a cast iron bed. Both mandrel and straight edges should be properly hardened and ground, and the cast iron bed permanently installed and accurately levelled. A third method, which is not easily applicable excepting in the case of a flywheel, is to employ a mandrel furnished with perfectly axial knife edges at its extremities.

Methods of Dynamic Balancing

Any running part that is statically balanced may or may not be dynamically balanced; but any piece that is in dynamic balance is of necessity also in balance statically. In the event of a statically balanced piece being out of dynamic balance, it requires two weights of equal and opposite moment to be applied at some definite axial distance apart, and any given want of dynamic balance can always be disposed of by two such weights and two only. It is obvious that in place of definitely adding weights, weight may be subtracted by drilling or otherwise.

There are two principles on which the design of a dynamic balancing machine may be based; the one is to run the piece about its geometric axis and measure or indicate the resulting forces or couple, weights being added until such couple is eliminated. The second method is to mount the piece in a springy or yielding support, spinning it at a high speed till it settles down to run on its principal axis; and it is then marked by any usual method to show defect of balance. It is the latter method that is most usually adopted. In this method it is advisable to test and mark the piece, first running in one direction and then reversed, to eliminate the effect of lag.

The author does not consider that the question of dynamic balancing has as yet been solved in a thoroughly satisfactory manner; the appliances in use, as already stated, do not, generally speaking, give reliable results in the hands of the ordinary skilled mechanic, and, as at present constructed, they are better placed in the laboratory than in the machine or fitting shop.

An item of balancing which is of dynamic character, though not dynamic balancing in the sense of the present discussion, is that necessary to determine the moment of inertia of flywheels used in engines in which reverse rotation is employed. Where such flywheels can be made of identical design the matter is simplified, but where this is not possible, some ready method of measuring the moment of inertia must be adopted. In connection with his experimental cars and the early 12 horsepower Lanchester car, the flywheels were tested by mounting them on a mandrel to which a pendulum was attached, and the moment of inertia was calculated from the time period of the pendulum. This apparatus was only used for initially determining the flywheel design, and after the first pair of wheels had been standardized by the pendulum method, the drawings were corrected to suit.

Vibrations Due to Lack of Rigidity

We now pass to the consideration of vibration of a kind entirely different from that dealt with in the preceding sections, involving a departure from our initial hypothesis. We have to deal with vibrations due to want of rigidity of the structural components of the engine. In the case of an engine having "looking glass" symmetry, such as the ordinary four-cylinder or six-cylinder engine, if we think of the engine as flexible about its middle point, as though the frame and crankshaft were articulated at that point, we can see that the two halves of the engine would rock in a symmetrical manner just as two separate two- or three-cylinder components would do if built as separate engines. We can,

therefore, see that any want of rigidity in the crankcase and structure of the engine would result in a vibratory bending of the engine itself under the influence of the reciprocating masses; this is one of the forms of vibration now contemplated.

In such a case as the above, and in practically all cases in which distortion of the engine components is concerned, it is quite easy to give the necessary strength to resist the vibratory motion and to prevent it from directly causing trouble; any reasonably good design will suffice for this purpose. The real difficulty arises when the vibration period due to this elasticity coincides with the running speed or with any periodic disturbance associated with the functioning of the engine. Thus, any natural vibration period in the engine structure may pick up the main piston period, or the octave piston period, or even one of the higher harmonics of the piston motion, or in some cases the impulse period may be the exciting cause, so that synchronization may take place at several different running speeds of the engine.

The period of a resonance within the engine frequently undergoes slight modification when the engine is transferred from a chassis on the test bench, owing to the difference in the rigidity of the mounting affecting the apparent stiffness of the engine itself. In this way it is sometimes found that a threshing point may be moved some 20 or 30 revolutions higher or lower in speed.

Stiffening the Parts the Best Solution

Where possible, the most satisfactory solution to the difficulty lies in so stiffening the parts as to carry the period of resonance outside the range of the running speeds, that is to say, to so stiffen the structure of the engine as to make the resonant period above the frequency of any known disturbing cause at the maximum proposed running speed. This method may be said to be applicable to all questions of bending, and to the torsion of the body of the engine itself, but it is not conveniently applicable in the case of the crankshaft.

In the structure of the engine, a well designed crank chamber and base is usually sufficient to give the engine the necessary rigidity in flexion; where a block cylinder is used, the rigidity of the engine in this respect can be made quite above question. In certain cases the question of bolting the cylinder groups one to another is worth consideration.

The torsional stiffness of the crankcase, owing to its tubular form, should be, and usually is, sufficient to prevent torsional vibration of the engine as a whole, but it is well to note that if the crankcase be considered a tubular member, the joint between the crankcase and the base must be made a thoroughly sound job. There is frequently a source of weakness here; the attachment bolts are often too light and too widely spaced to do more than act as a means of retaining oil. It should be remembered by the designer that the joint in question is in shear when the crankcase as a whole is in torsion, and either sufficient bolts should be provided to give a sound frictional grip capable of taking shear, or a sufficient number of the bolts should be made a dowel fit. The torsional stiffness of the engine also would be considerably aided by the bolting together of the cylinder groups.

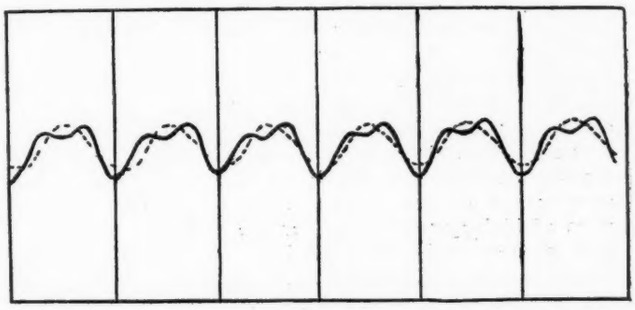
Torsional Vibration Most Troublesome

By far the greatest trouble in multi-cylinder engines is on the score of torsional vibration, and in particular crankshaft torsion. At the present time, when this source of weakness has been so clearly established, the possibility of trouble from such a cause seems more than obvious, but it required a considerable amount of labor to definitely locate the disease from which the early six-cylinder engine suffered; it is unquestionably a fact that the popularity of the six-cylinder car was held back for many years by the vibration troubles which, for a time, were not properly understood. More than one firm attempted to market a six-cylinder car, but had, for a time, to admit failure.

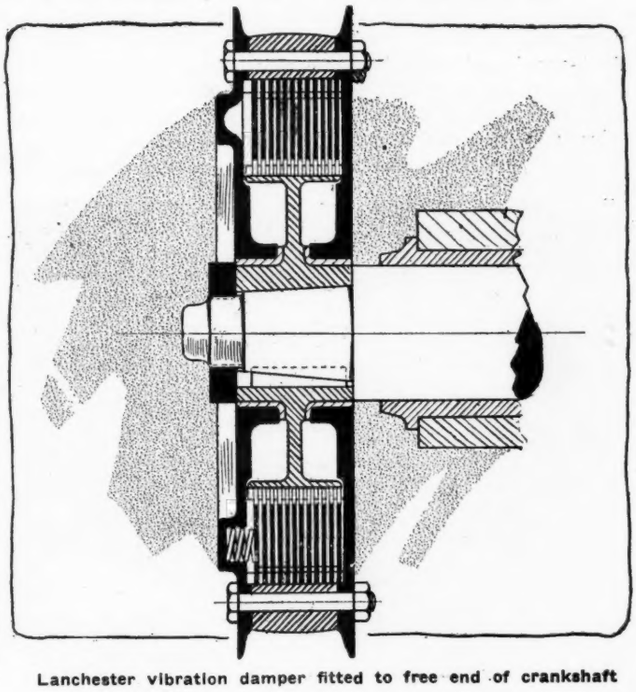
The main exciting causes of torsional crank vibration are to be found in the torque variations due, firstly, to inertia, and, secondly, to cylinder pressure. The exciting cause in a six-cylinder engine (and it is here that torsional vibrations give the most trouble) occurs three times per revolution, that is to say, there are three explosion impulses per revolution, and thus the synchronous vibration will take place when one revolution of the engine corresponds to three complete periods of the crank in torsion. We may consequently expect, in cases of torsional vibration, to have two marked threshing points having a speed relation of two to three; the lower of these points will be that consequent on cylinder pressure, the higher of these points will be that due to piston inertia. It is a common experience of designers who have been troubled with six-cylinder engine vibration to have had two marked periods of the character mentioned. The matter, however, is far from being as simple as set out. There is no doubt that the cylinder farthest from the flywheel, acting as it does on the tail of the crankshaft where its amplitude of motion is greatest is the dominant factor in stimulating vibration, but inasmuch as the inertia torque vibrations of the other pistons also take effect, and these are separated by intervals of a third of a revolution, the total is complex.

There is a torsional vibration due to the octave component of the piston motion which we may expect to give a synchronous revolution speed half that of the main inertia torsion, so that if, for example, the threshing point due to the ex-

(*Continued on page* 833)



Torque may amount to about one-fifth or one-sixth of the mean full load torque, and so if considered as superposed on the driving torque will appear somewhat as indicated diagrammatically



Lanchester vibration damper fitted to free end of crankshaft

Welds Tungsten to Low Carbon Steel

Process Useful in Manufacture of Cutting Tools for Machine Work Where Big Production Is Required—Good for Valves

BIG production has resulted in the necessity of the use of tungsten or high-speed steel for lathe and planer tools used in the machining of steel. It is only the use of this peculiarly adapted metal that permits of the economical tool upkeep which is necessary for uninterrupted production by high-speed machines.

Tungsten steel is expensive, costing anywhere from 75 cents to $1.25 per pound. Common tool steel costs but 30 cents a pound and the fact that the more expensive product has almost entirely displaced the cheaper one in a large and important field shows that the use of tungsten steel has been deemed an absolute necessity on the part of the manufacturer. He feels that he must use the high speed steel in his machine shop in order to lower the cost of the product.

It must not be gathered from this that the high speed steel tool is inherently economical, for the exact opposite is the case. This becomes evident when it is considered that only about 15 per cent. of the steel in a lathe or planer tool is actually used for cutting. The rest is wasted in grinding or is cut off by the blacksmith when he dresses the tool. After several cuttings the tool becomes too short for use and nothing can be done with the short piece of high-speed steel left over except to throw it in the scrap heap. The amount of steel wasted in a high-speed steel tool is graphically shown in the drawings on the right side of Fig. 4.

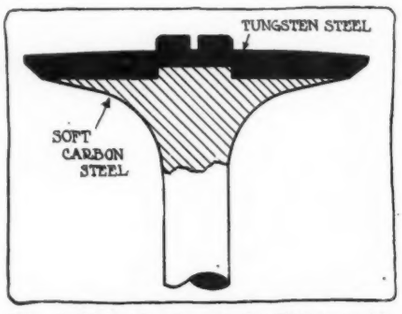


Fig. 1—Valve head made by Rosner welding method

Has Special Welding Process

Adolph Rosner, of Bridgeport, Conn., seeks to overcome this loss of high-speed steel by waste through a welding process which he has invented. By this process a piece of high-speed steel which is comparatively small in proportion to the entire tool is welded to a shank consisting of low carbon steel which may be from .20 to .50 per cent. carbon. The piece of high-speed steel can be either welded to the side or on top of the shank, depending on the shape of the tool, and any of the combinations shown on the left side of Fig. 2 may be made.

The welding is done in a gas furnace at a temperature which exceeds 2,000 degrees Fahrenheit and takes, according to Mr. Rosner, but a few seconds. It is claimed that the use of these welded tools gives a saving of about 40 per cent. in tool cost and that should the point become soft it can be rehardened as often as desired.

A group of tools, such as are used in nearly any machine shop, which have been made by this process, is shown in Fig. 4. These are all built up cutters with low carbon steel bodies and with high-speed or tungsten steel as a cutting edge. In order to make the tool stiff under a long overhang, that is where the work is done at some distance from the tool post the shank is heat-treated. This process can be applied to such tools as milling cutters, large taps and reamers, cutters for gear shapers, boring bar cutters, die blocks, knives for wood turners, etc.

The rapidly growing use of tungsten steel for poppet valves makes this welding process of particular interest to the automobile manufacturer as by its means it is claimed that a tungsten head can be successfully welded to a low carbon steel stem. This makes a less expensive valve than where it is made entirely from tungsten steel, and a further advantage claimed for it is that the stem being soft will not tend to wear the valve guide as rapidly as would the harder steel. According to Mr. Rosner, there is no need of making the whole valve of tungsten as only the seat is required.

Composite Valves Are Cheaper

In manufacturing the valve it is claimed that a cheaper job is done per valve owing to the fact that only a relatively small quantity of tungsten steel is used. The weld is made in the manner shown in Fig. 1. The valve seat is made from tungsten steel and punched from flat stock. The center por-

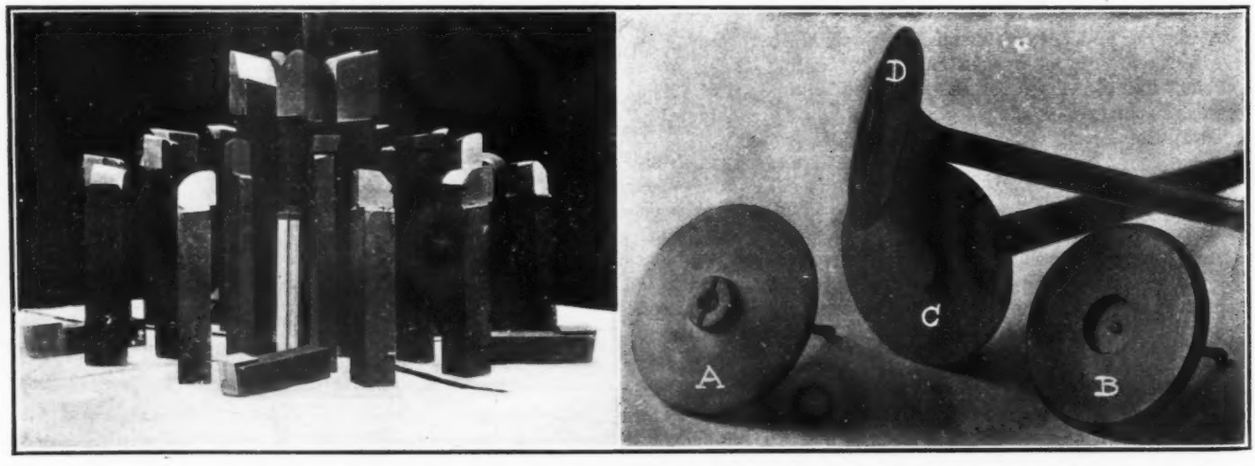


Fig. 2—Left—Tools made by welding by the Rosner process. Right—Valve in various stages of manufacture

tion is raised out of the flat disk by punching it only part way. Fig. 3, at A and B shows the tungsten valve seat all machined before welding. C is the soft steel stem and D the finished valve.

Before welding the head to the low carbon steel stem the disk-shaped head is machined to the right shape, bevel, centered and even the screw driver slot put in. It must be remembered that the connection between the head and stem is a welding process and not brazing.

Mr. Rossner's secret lies in the high temperature, the short time required and a special flux. After welding the valve, the head is hard, being made of high-speed steel, and cannot be machined. The valve stem which is soft, is then machined to size and shape and the seat ground to the right angle to complete the valve. The inventor claims that the weld is not affected by high temperatures. He also states that while tests have not been made in a tensile machine that in an endeavor to break the weld the high-speed steel gave way before the joint. There are no manufacturers at the present time using Mr. Rosner's process on valves.

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Engine Balancing by Practical Methods

(*Continued from page* 831)

plosion torque be located at 1,000 revolutions per minute, there will be a bad threshing due to the main piston inertia at 1,500 revolutions, and the minor threshing point, due to the octave component piston inertia at 750.

Lanchester Vibration Damper

The author has found the solution to the torsional vibration trouble in a vibration damper attached to the tail or free end of the crankshaft. This damper, in the form fitted by the Daimler Company, comprises a small flywheel mounted to rotate freely on bearings, and in driving connection with the crankshaft through a multi-disk clutch arranged in an oil bath, ordinary viscous cylinder oil being used as lubrication. The damper, so fitted, does not impede rotational motion in the smallest degree—it is carried round with the crankshaft without offering any resistance—but it forms an immediate and considerable resistance to anything in the nature of angular or torsional vibration. The construction of the damper will be seen from reference to Fig. 1. It is so proportioned as to render anything in the nature of a crank vibration dead beat, that is to say, if the crank were twisted through a small angle and let go, it would return at once to its state of equilibrium without repeated oscillation. To effect this, as is well known, the law of friction between the clutch surfaces should follow the viscous law of fluid friction; this is secured by the employment of a wide extent of surface, separated by thin films of viscid oil.

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State of Iowa Gives Automobile Lectures

AMES, IA., April 10—A series of five lectures on the care and operation of the automobile is being given in thirty cities in Iowa by R. E. Davis in charge of this special branch of the Engineering Extension Department of Iowa State College at Ames, Ia.

This work was financed by a special appropriation of this state to carry on the work from December 1, 1913, to June 1, 1914. Mr. Davis has been identified with several of the largest automobile factories for the past 4 years and was selected by the executive officials of Iowa State College for this lecture course. After June 1, 1914, Mr. Davis has not definitely decided whether he will return to the field of passenger car engineering or remain with the College at Ames.

Thursday, Friday and Saturday of last week, Mr. Davis held an Institute at Dubuque, Ia., under the direction of the Dubuque Automobile Club. The meetings were attended by

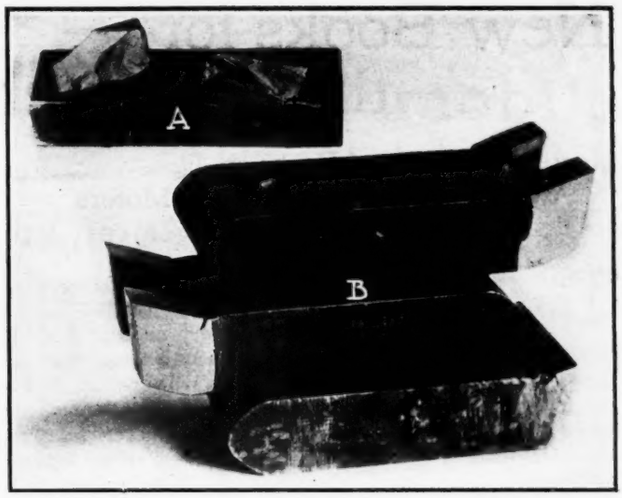


Fig. 3—A—Showing how high speed steel broke before the weld. B—Three cutting tools for a Lodge & Shipley crankshaft turning machine. The shank is low carbon steel costing 3 cents per pound

an enthusiastic audience of approximately 300 automobile owners as well as many prominent business men of Dubuque. A similar institute is to be given in Davenport, Ia., the last 3 days of this week under the direction of the Davenport Automobile Club.

The series of lectures are illustrated by nearly 500 lantern slides which show the vital details of the machinery which cannot be seen ordinarily and the lecturer explains the essential points affecting the care and operation which are not commonly known to drivers, dealers and repair men or anyone else outside of the automobile engineering class. Mr. Davis is a member of the Society of Automobile Engineers and he has been advocating a uniform state law for Iowa which shall specify all traffic regulations instead of allowing each city to make a different regulation.

Outline of Lectures:

1. Carburetion and Ignition.
2. Electric starting and lighting.
3. Gasoline motors.
4. Transmissions, Control, Systems, Axles.
5. Tires, Road Rules, Safety Precautions.

Each lecture is an exhaustive treatise on the principles of operation and care of the subject in question. The lecture is always followed by from 40 to 80 discussions by the audience.

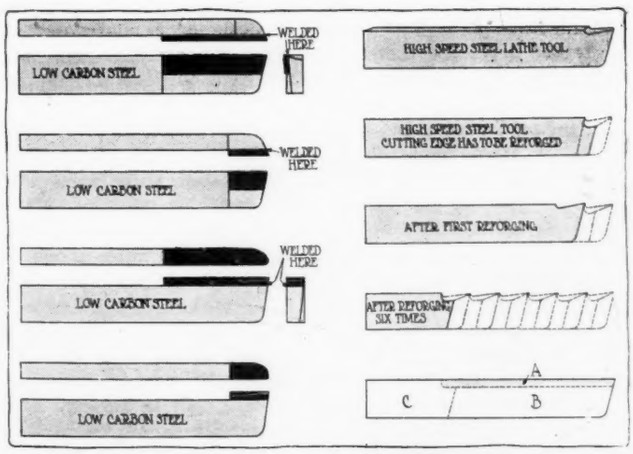


Fig. 4—Left—Tools made by welding high speed steel to low carbon shank. Right—Tool made of high speed steel. A—Cutting edge. B—High speed steel taken off in re-forging and grinding. C—Tool is too short and almost always scrapped.

New Books for the Engineer

New Dictionary and Books on Jigs and Fixtures, Single-Phase Motors, Scientific Management, Etc.

THE technical and scientific press is rapidly adding to the already large supply of books on subjects allied with automobile construction. Yet every addition is to be welcome, as it increases our knowledge of engineering subjects. The books reviewed on this page will give an idea of the interesting variety of the subjects that are treated, and while most of the books are technical and are for the engineer, some of them will be found of value to the layman.

NEW STANDARD DICTIONARY, FUNK & WAGNALLS CO., New York City, 2916 pages liberally illustrated, three-quarter morocco, $30.

This work is a development and extension of that originally issued by the present publisher under the title of "A Standard Dictionary of the English Language." The endeavor has been to retain all those characteristic features which have stood the test of time, criticism and popular approval, while adding all the new information demanded by the world's advance in twenty years, and all the new features that may promote ready and effective consultation. To attain this end every word has been re-examined, every quotation, definition or other item studied anew, with a view of bringing all the highest possible perfection by re-editing and resetting. There has been, in addition, the strenuous endeavor to gather from every field of scholarship, art, science, exploration, commerce, industry or invention all new matter of real value or utility.

Of special interest to the automobilist is the up-to-date treatment of motoring, motor boating and aviation terms. The editors of the motoring department were Elbert H. Gary, LL.B., past-president of the A. A. A., and Dave H. Morris, New York City. The motor boating department was under the direction of Julian Chase, editor of *Motor Boating*, New York City, and aviation by no less an authority than Orville Wright.

JIGS AND FIXTURES, a reference book, by Fred H. Colvin, associate editor, American Machinist, and Lucian L. Hass, A.S.M.E., published by the McGraw-Hill Book Co., New York City, 168 pages, with line cuts, cloth, $2.00.

In these days of modern manufacturing, jigs and fixtures have become necessary, both for interchangeability and reduced costs, and while every tool designer is confronted by different problems, there are certain fundamental principles which can be modified to meet existing conditions and applied in most cases.

Bearing this in mind, the authors have endeavored to show these principles as nearly in the order of their application as possible, so that the designer can select such parts and methods as seem best suited to his particular problem. While they have not taken up all the known devices used in jig work, they have shown enough to enable a suitable choice to be made and to suggest other methods should these not meet the requirements.

The beginning treats of system in the tool room, the filing of blueprints and the use of the card index. The next six chapters are devoted to jig work. The different kinds of jigs are described, as well as the details of jig making and clamping methods. The next chapter tells of the use of pneumatic fixtures for holding work. The use of the latch jig, the design of gauges, the design of machine vise jaws and the construction and use of mandrels takes up the remaining chapters.

REPORT OF THE MASSACHUSETTS HIGHWAY COMMISSION for the fiscal year ending November, 1912, Wright & Potter Printing Co., Boston, Mass. Cloth, 320 pages.

This is the twentieth annual report of the commission and is divided into two parts, the first taking up State highways and motor vehicles and the second the supervision of telephone and telegraph companies.

The report begins with a review of the work done and the condition of the roads in various parts of the state, information valuable to the tourist. The rest of the first part gives statistics on the cost of maintenance of roads and in the volume of traffic at various points throughout the state.

THE AUTOMOBILE ENGINEER YEAR BOOK FOR 1914, published by Iliffe & Sons, Limited, London, E. C., 190 pages, cloth, 1/6 net.

This book contains all sorts of tables of value to the engineer and designer, and specifications of materials, tabulation of the principal characteristics of the automobiles of the world, a list of racing records and a dictionary of French and English terms.

Everything that the designer requires for reference is to be found, from the sizes of standard ball bearings and S. A. E. lock washers to fuel consumption figures and acceleration tables.

SINGLE PHASE COMMUTATOR MOTORS, by F. Creedy, A.G.B.I., A.M.I.E.E., published by Constable & Co., 10 Orange street, Leicester Square, London, England. 112 pages with line cuts. 7/6 net.

The object of this work is to present in a simple, clear fashion the phenomena of the single phase motor. It is the result of many years of work, and aims to a middle course, one that gives a complete understanding of the subject without bewildering the reader with mathematics.

The book opens with a consideration of single-phase motors and characteristics of series type motors. Flux and current distribution in alternating motors is studied, and then series and single phase shunt motors are taken up. The closing chapters deal with the effects of magnetic leakage on series motors, the influence of resistance, saturation and the commutating coil, and the comparison of theory with experiment.

APPLIED METHODS OF SCIENTIFIC MANAGEMENT, by Frederic A. Parkhurst, M.E., associate A.S.M.E., published by John Wiley & Sons, New York City, 8vo., xii + 325 pages, 48 figures and 9 plates. Cloth, $2.00.

This work is an amplification of the author's article, "Applied Methods of Scientific Management," which appeared in *Industrial Engineering*, and is a study of the most advanced methods of shop management. It begins with a description of the Ferracute Machine Co., a plant operating under scientific management. The functions of the various parts of the organization and their relation to the other units of the system are described and studied. The duties of superintendent, production clerk, shop engineer, route clerk, etc., are given consideration.

Succeeding chapters take up the necessity of systematic routing, the importance of a modern system of stores accounting, systematizing shop practice, methods to follow in making time studies, and comparisons of results obtained under old and new methods.

CHINA REVOLUTIONIZED, by John Stuart Thompson, published by Bobbs Merrill Co., Indianapolis, Ind., 590 pages liberally illustrated with half-tone engravings. Cloth, $2.50.

Written by a keen observer and a master of the art of description, this work will have the approbation of anyone interested in this old, and yet new, country. Of special importance are the chapters on business methods, industry and finance. Every possible phase of Chinese development has been touched upon and a rare fund of information is supplied on the customs and characteristics of the people who inhabit this vast territory.

A Light Four-Cylinder Oldsmobile

Unit Power Plant—Block Motor 3½ by 5 Inches Develops 30 Brake Horsepower—Car Weighs 2,700 Pounds

Fig. 1—Two views of the new four-cylinder Oldsmobile. The partial rear view gives an idea of the neat compact design with the fenders following the contour of the wheels, the pressure gasoline tank and extra tire carrier at the rear and the running board compartment at the side. The view at the right shows the left side of the car. Note the severe simple lines used in the design

AFTER giving up the production of four-cylinder cars for a year, the Olds Motor Works, Lansing, Mich., is again to give its attention to this type of machine in the form of a snappy little vehicle which has all of the earmarks of the larger six-cylinder Oldsmobile but on a smaller scale. This new Oldsmobile is to sell for $1,350 with full equipment and ready for the road.

Really a Light Car

It is really a light car, this model 42. Its road weight is about 2,700 pounds and its brake horsepower with its newly designed 3½ by 5-inch engine is 30, and the displacement 194.2 cu. in. This is ample power to pull it through any roads, and in test the car has done 55 miles an hour with two passengers and 540 pounds of sand ballast. This was over snowy roads, too.

The designers of this new Oldsmobile have not made the mistake of slighting any of the small details which help to make a thoroughly finished appearance to the whole, and the result is that the car has the style which is essential these days along with low cost.

The body lines are practically the same as those of the big six, and, in fact, throughout the engine as well as the body the same general ideas have been used except that the sizes are less.

The new model 42 has a block-cast valve-in-the-head engine and together with the gearbox forms a unit power plant of exceptional compactness and lightness of weight. The cylinder head is removable as a whole, and this head carries the valve mechanism complete. That is, the rocker arms, valves and valve pockets are in unit with this head which is securely bolted to the cylinder casting proper with a gasket between the two parts.

New Valve Mechanism

Referring to the cross sectional view of the cylinder shown in Fig. 5 the scheme of design will be readily apparent, as will the new type of valve mechanism employed. The rocker arms are of substantial form and well pivoted, while the end bearing on the end of the valve stem has a form of surface which allows proper rolling contact. The opposite end of the rocker also is of new design in that a ball and socket arrangement is employed. This is seen at B. The upper end of the push rod leading from the cam carries the ball portion while the socket is a part of the rocker. This makes for positive and noiseless connection between the two. The aluminum plate C completely incloses all eight valve mechanisms and prevents any noise from this source. Unlike most valve-in-the-head constructions, the long rods running up from the camshaft do not pass outside of the cylinders completely, but are entirely inclosed within a valve rod chamber at the side of the cylinder casting and thence through a passage in the cylinder head around which the jacket water passes.

Thus, in looking at the assembled power plant, the observer is scarcely able to distinguish the overhead valve construction from the average L-head design. Two plates on the valve rod side of the engine may be removed by hand screws. These allow the lower ends of the valve rods to be reached for inspection or adjustment. Conventional tappets bear against the cams, and these in turn operate the valve rods.

Intake Is Waterjacketed

Further reference to the sectional view of the cylinders shows how the intake and exhaust passages reach the valve openings into the cylinder heads. The intake I is waterjacketed where it passes into the head proper which aids in carburetion. The exhaust passage E goes straight to the manifold with the least possible resistance to gas flow and to the opposite side of the head from the intake. Thus there is an individual opening into each cylinder from the exhaust header.

The spark plug holes are tapped into the cylinder head just below the exhaust passage and on a slight angle, while the priming cocks are arranged just below them. Briefly, then, the cylinder head carries every important part of the motor's operation, providing as it does for the intake and exhaust of the gases, the sparking, priming and silencing of the valve mechanism. Its removal makes accessible every important feature of the upper part of the power plant.

Three-Bearing Crankshaft

The crankshaft and camshaft are each carried on three ample bearings of the plain type. All reciprocating parts are

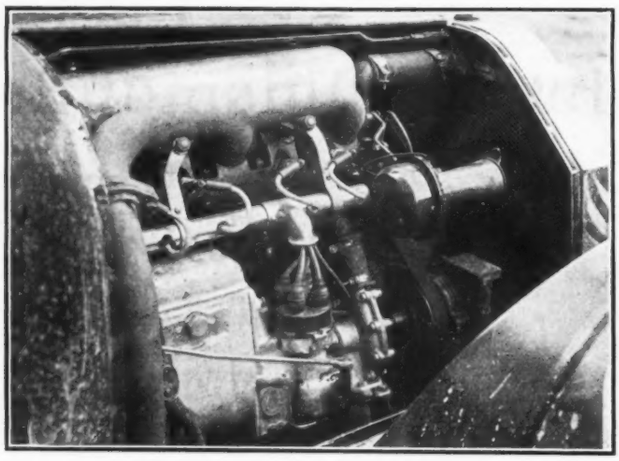


Fig. 2—Right side of the new Oldsmobile four-cylinder motor showing the Delco installation and exhaust manifold, also mounting of spark plugs in cylinders. The motor completely fills the hood

conventionally designed and in strict accordance with the latest of the engineering dictates of the Northway Motor & Mfg. Co.'s experimental and engineering departments. The pistons carry three rings each and have hollow steel piston pins. The connecting rods are I-beam drop forgings and each is fastened to its lower bearing by substantial bolts and a strap.

The lubrication system of the engine is a combination splash and force-feed type such as operative conditions of today have shown to best take care of all grades and angles of the power unit. There is an individual splash trough under each connecting-rod, and this dips into it, splashing the oil up into the cylinder in the usual way. A pump circulates the oil to these troughs from a well, while the camshaft and generator operating mechanism is lubricated by a special lead direct to it. This is all inclosed at the front end in the conventional manner.

The electrical functions are taken care of completely by a standard Delco combination unit, which provides current for ignition as well as for starting and lighting. That is, the Delco unit is a combined motor and generator, which is provided with an ignition distributor in unit. For cranking it gears to the flywheel through reduction gears which give a ratio of about 24 to 1. That is, the unit when operating as a cranking motor runs 24 times as fast as the engine which it turns over at about 100 revolutions a minute. The gears are thrown in in the usual way by pressing a pedal after the ignition current has been switched on at the dash.

The system has all necessary cutouts and switches to preclude any discharge back through the generator from the storage battery, or any tendency to overcharge this battery, which is a 6-volt type. The generator begins to charge at about 15 miles an hour.

Driveshaft Is Inclosed

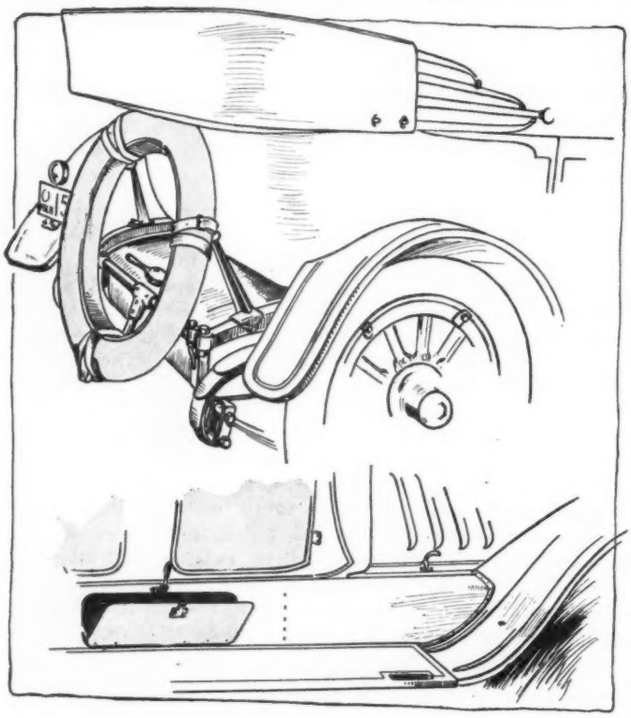
From the motor the power goes back through a cone clutch the diameter of which is 12½ inches and the face 2½ inches. The angle of the cone is 11 degrees. The gearcase bolts compactly to the rear of the flywheel and clutch housing, while back of it, the main driveshaft is inclosed within a torsion tube and is provided with a universal joint before it enters this tube.

A feature of note is the compact assembly of the brake and gearshift levers which are arranged for center control, the steering being on the left. Four bolts fasten this assembly of levers to the rear of the gearbox, and thus no cross piece construction is necessary to carry them. This is in accord with best practice and any frame weaving does not affect the controls in any way. In this position also the shortest possible gear shifting rods running to the shifting forks from the lower end of the gearshift lever are necessitated which is of course an advantage for simplicity and positiveness of action.

The rear axle is a floating construction, and presents no unusual features. The rear of the torsion tube bolts to the axle housing, and the axle shafts are carried on Hyatt roller bearings. These shafts are of nickel steel and 1⅛ inch in diameter while the main shaft is 1¼ inch in diameter. The ends of the rear axle unit carry 12 inch internal expanding and external contracting brakes, the drums being bolted to the artillery wood wheels and having a face width of 1½ inch.

Low Center of Gravity

Low hanging of the whole car and consequent low center of gravity is attained by the use of long springs which are



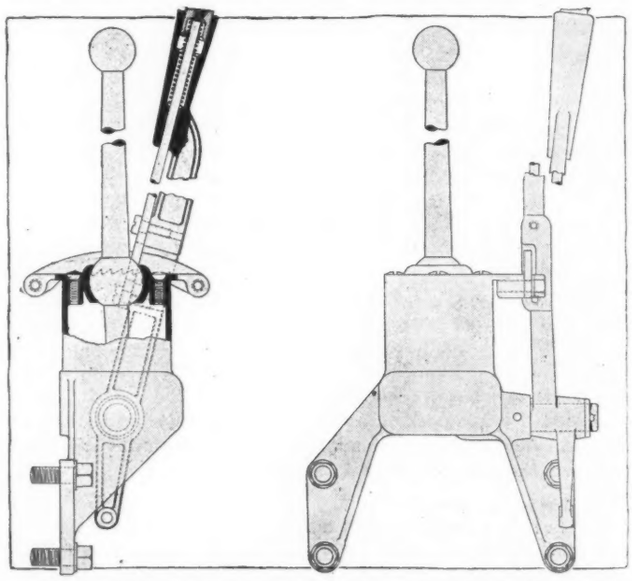


Fig. 3—At the left. Upper—Sketch of rear construction used in light four-cylinder Oldsmobile. Below—Tool Compartment in running board

Fig. 4—Above. At the left—Part section through the gearshift and emergency brake lever used on the light four-cylinder Oldsmobile. At the right—Compact assembly of these levers

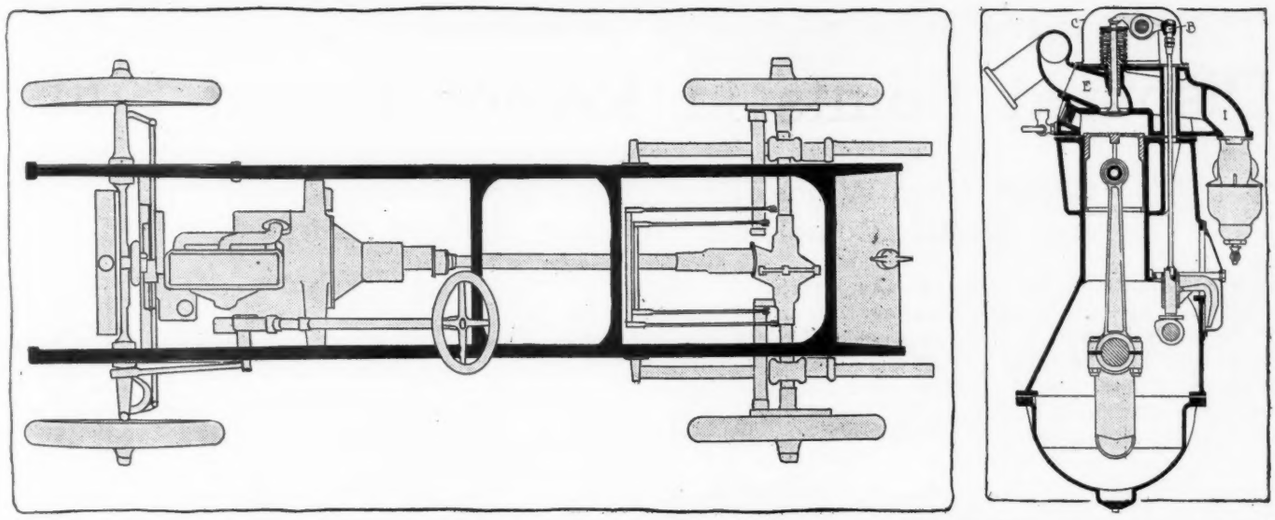


Fig. 5—At the left—Plan view of chassis of new four-cylinder Oldsmobile, showing unit power plant left drive and center control and mounting of the fuel tank at the rear. At the right—Cross section of motor, showing valve mechanism in removable head

underslung from the axle in the rear. The front springs are above it. All springs are 2 inches wide, while the lengths are 35 and 48 inches, front and rear respectively. The rear springs are three-quarter elliptic. With this suspension, however, the minimum clearance is still ample for all road conditions, being 10½ inches.

The gasoline tank is suspended from the frame at the rear just as is done with the big car. It has a capacity of 12 gallons and operates with an air pressure of 1½ pounds from a small pump cam operated by the motor. Back of the tank is arranged a substantial carrier for the spare demountable.

The wheels have Baker demountable rims and carry 33 by 4 inch tires front and rear. The wheelbase is 110 inches and the tread standard.

Body Work High Grade

The cowl dash is especially attractive. It is of Circassian walnut of natural finish, as is also the steering wheel which is 17 inches in diameter. There are small compartments in the cowl at either side which may be used for the carrying of guide books, gloves, goggles and the like. Each is provided with a lock. The various instruments on the dash are symmetrically and conveniently arranged, while a dash lamp makes all gauges visible at night.

The running boards are of cast aluminum and provided with small mud scrapers at each door. Tool compartments are arranged within the aprons at the sides and are also provided with locks. These tool spaces afford ample room for all necessary paraphernalia.

The upholstery is of standard type of leather, while the body colors are optionally a Brewster green or an Orriford Lake. The panels along the top of the doors and running between the seats on the sides are of black just as in the big car, while the cowl also presents the same general lines as that of its older and larger brother.

Among the equipment may be mentioned the Jiffy curtains which are carried in a special pocket, the eight-day clock, Stewart speedometer, strap robe rail, split vision windshield.

Some of the body dimensions may serve as an indicator of the spaciousness of the car. The width of the rear seat is 45 inches; distance from front of rear seat cushion to extreme length of leg room 29 inches; width of front seat 39 inches; distance from front of front seat to clutch pedal 20½ inches; distance from front of front seat to dash 30 inches.

The Olds factory plans an output of about 5,000 of this model for the coming year.

Tests show that the motor runs on the average 17.5 miles to the gallon of fuel.

The following are the main dimensions of the power plant:

Parts	Inches.
Valve, diameter in the clear	1⅝
Valve seat 1/16 inch by 45 degrees.	
Valve, stem diameter	⅜
Valve, lift	5/16
Piston length	4½
Connecting rod length	10⅜
Diameter piston pin	⅞
Length piston pin bearing	1⅞
Connecting rod lower bearings:	
Length	2¼
Diameter	1⅝
Front crankshaft bearing:	
Length	3 7/32
Diameter	1⅝
Center crankshaft bearing:	
Length	2⅛
Diameter	1⅞
Rear crankshaft bearing:	
Length	3 7/16
Diameter	1 15/16
Diameter camshaft	1
Front camshaft bearing:	
Length	2
Diameter	1⅛
Center camshaft bearing:	
Length	1
Diameter	2⅛
Rear camshaft bearing:	
Length	1¾
Diameter	1
Diameter flywheel	14
Face flywheel	4 3/16

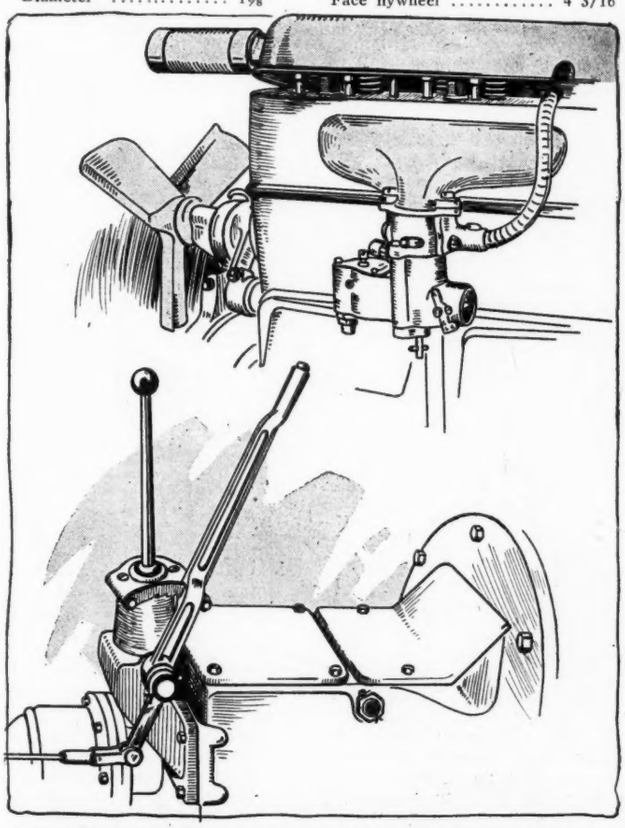


Fig. 6—Upper—Left side of four-cylinder Oldsmobile block motor showing removable cylinder head, water jacketed intake manifold and aluminum fan. Lower—Gear box and mounting of levers

Disputed Points in Recent Patent Suits

Claims Upon Which Hinged the Royce, Delco, Schrader and Bosch Complaints Against Alleged Infringers

NEW YORK CITY, April 13—As reported in THE AUTOMOBILE for April 9 on page 795, a final decree against the R. & L. Co. was rendered in the Royce patent suit. The plaintiff in the case was Frederick H. Royce, of the Rolls Royce Co., of England, and the claim was that the means of suspending the motor and gearbox used by the R. & L. Co., in selling Garford cars was an infringement on the Royce patent, No. 888,535, granted on May 26, 1908.

The claim which the plaintiff asserted was infringed was stated in full in THE AUTOMOBILE. This claim is herewith illustrated in Fig. 1. The keynote of the patent is the flexible suspension of the motor and gearbox housing and referring to the illustration this mounting is shown. Means for suspending the motor and gearbox to the frame consist of four projecting arms, B and C. The rear two arms B are shown rigidly connected to the frame of the car. The forward two arms C are connected to the frame by a pivot joint D formed by a bell crank lever. The upper view of the illustration shows the bell crank lever arrangement in elevation while the lower view shows it in plan. The bell crank arrangement is hung from the frame X by means of a bracket E and the pivot joint given by the pins F. The motor and gearset housing is denoted by A.

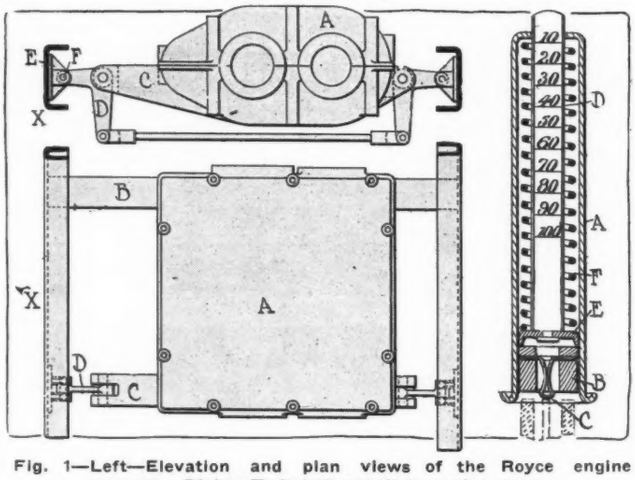


Fig. 1—Left—Elevation and plan views of the Royce engine support. Right—Twitchell pencil-type tire gauge

Delco Sues on Two Patents

The Dayton Engineering Laboratories Co. of Dayton, O., makers of the Delco ignition, lighting and starting system, are suing the Sidney B. Bowman Co. for an alleged infringement of patents Nos. 745,157 and 842,827 on electric starter construction. The suit is now in the courts and answer has been filed by the defendant. The specific complaint is that the defendant sold a Marmon car equipped with a North East starting system, which device the Delco Co. claims is an infringement on their patents.

The two patents involved in this suit were granted to C. J. Coleman under dates of November 24, 1903 and January 29, 1907. The earlier of these two patents, which is illustrated in Fig. 2, directly specifies a means for starting the engine by the application of a motor-generator and for using the engine for the purpose of restoring energy which would be subsequently used in making a start. Also described in the patent are means for the control of the speed ratio of the vehicle.

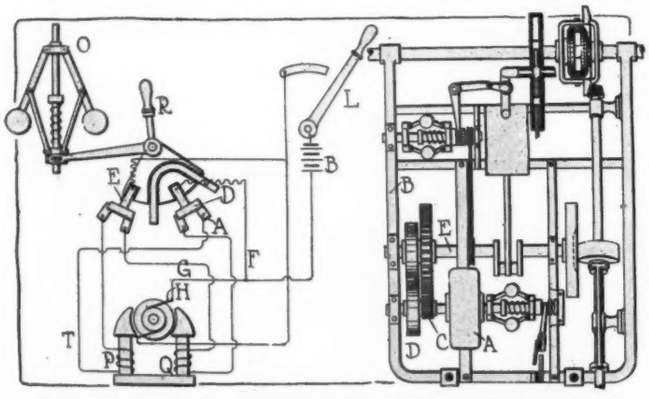


Fig. 2—Left—Wiring diagram layout specified in Delco patent No. 842,827 issued to C. J. Coleman under date of January 29, 1907. With this method of wiring the armature coils are always in multiple with the field winding, and when the controlling switch R is actuated by means of the governor O through crankshaft speed the current will flow through the field magnet coil in series and thus produce a proportionally high torque under load owing to the inadherent qualities of a series motor. Right—Plan view of the Coleman patent owned by the Delco company which specifies a differential gear between the engine and motor-generator

A horizontal section of the Coleman layout is given in Fig. 2. It consists of a motor generator A supported in the car frame B and connected through a train of gears C and D to the crankshaft E. The crankshaft E has a differential connection with the motor generator so that the latter drives at one speed ratio and is driven at another. This differential connection is effected by having two different sets of gearing C and D which can be used alternately by means of a friction clutch.

The second Coleman patent deals with the means provided for automatically changing the motor-generator functions from those of a motor to a generator according to crankshaft speed and also for giving a maximum torque for starting. Special provision is made in this patent for controlling the speed of the engine so that it will drive the motor-generator as a dynamo at a constant speed. Referring to Fig. 2 a modified layout of the electrical connections is shown.

In this illustration one set of coils is mounted in the field magnet and these are connected in multiple when the motor-generator is used as a motor and in series when used as a dynamo. The armature coils are always in multiple with the field windings. To effect this scheme the brushes D and E are made of such a width that they bridge the two switch-blocks with which they move in contact. When the controlling lever L is actuated to start the engine the current flows from the battery B through the wires F and G, upper commutator brush H, armature coils, lower commutator brush, and thence back to the battery. Current also flows from the wire F to the brush D and divides at this point into two parts, one of which flows through the block H, wire T, coil P and thence to the brush E where the two currents reunite. The other current passes through the

opposite side of the circuit through the other coil shown at Q.

With this arrangement when the controlling switch R is actuated by the governor O, operated by the crankshaft speed, the current will flow through the field magnet coil in series, thus producing a proportionately high torque under load, owing to the inherent qualities of a series motor.

Schrader Has Pencil Gauge

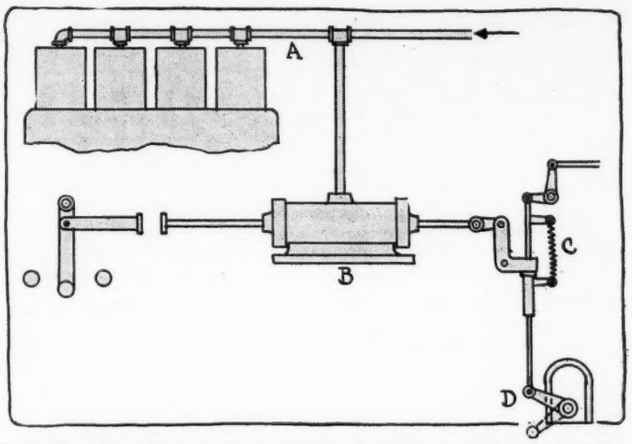
In the suit brought by A. Schrader's Son, Inc., against the 35% Automobile Supply Co. of New York, alleging infringement of the Twitchell patent on the pencil type of pressure gauge, Patent No. 927,298, issued to Charles R. Twitchell on July 6, 1909, is involved. This design is shown in Fig. 1. A tubular housing A includes a ringed shaped packing B which may be of leather or other suitable material. Through the center of this packing projects the valve depressor C. A gauge bar D extends upward through the housing and when the gauge is slipped on the tire valve this gauge bar is forced upward by the escaping air, which actuates the piston E against the spring F. As the gauge bar is separate from the piston it remains in a position suitable to indicate the pressure after the device has been removed from the tire valve. At this time the tire valve will, of course, resume its seat.

Bosch Holds Honold Patents

The Honold patents have been brought before the eyes of the public recently by a suit brought by the Bosch Magneto Co. against F. A. Baker. In this suit the plaintiff asserts an infringement against patent No. 900,542 and a bill of complaint was also filed for infringement of patent No. 974,967. The Baker company is a Brooklyn dealer in Indian motorcycles made by the Hendee Mfg. Co., Springfield, Mass.

The object of patent No. 900,542 is to provide a high-tension magneto in which the voltage at the plug points is sustained for an appreciable period of time. The magneto is shown in section in Fig. 3 and a wiring diagram is given also. The invention includes a shunt which is connected to two different points of the armature circuit and which includes an interrupter operated by the rotation of the armature. As the armature continues to rotate, the inventor claims a continuous arc is sustained across the spark plug points, due to the numerous interruptions of the shunt circuit by means of the interrupter.

Patent No. 974,967, which is illustrated in Fig. 4, deals specifically with the adaption of the magneto to a V-type engine and includes the shaping of the armature and field iron in such a manner that the maximum spark is advanced and retarded in turns in every half revolution of the magneto armature so as to correspond with the peculiar requirements of a V-type engine. The mounting of the magneto is shown in Fig. 4, and the shaping of the armature and pole pieces is illustrated in Fig. 4. The eight claims of this patent are centered about the construction involved in this mounting and adaptation of the armature and field.



McMurtry patent showing means of actuating starter control

McMurtry Device for Automobile Starters

NEW YORK CITY, April 14—Alden L. McMurtry has patented under date of February 17 a device for automatically controlling the starting system of an automobile so that the operation of starting is reduced to a single movement. The device which is illustrated herewith consists of a manually operated spark control mechanism in connection with an automatic device which performs the necessary operations for starting a car when the operator moves the starting switch.

The control device is actuated by means of a cylinder including a pair of pistons as shown at B. When the pistons in the main cylinders A send a certain amount of compression pressure through the connecting pipe the pistons at B are forced apart and through linkage operate the timer at D.

The patent No. is 1,087,454 and was filed January 31, 1912. It has five claims dealing with the automatic actuating device which is energized by the storage battery simultaneously with the operation of the starting motor; a conductor through which the starting motor is supplied with energy and from which the automatic device is supplied with current concurrently with the starting motor, and means for operating the manual mechanism and interconnecting the automatic mechanism with the manual.

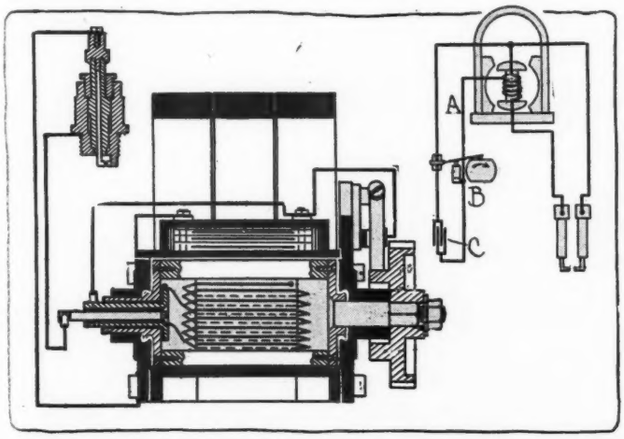


Fig. 3—Sectional view of the magneto patented by Honold designed to give a prolonged high-tension spark between the plug points with a high-tension magneto. This is produced by the shunt coil A working through the interrupter B and condenser C

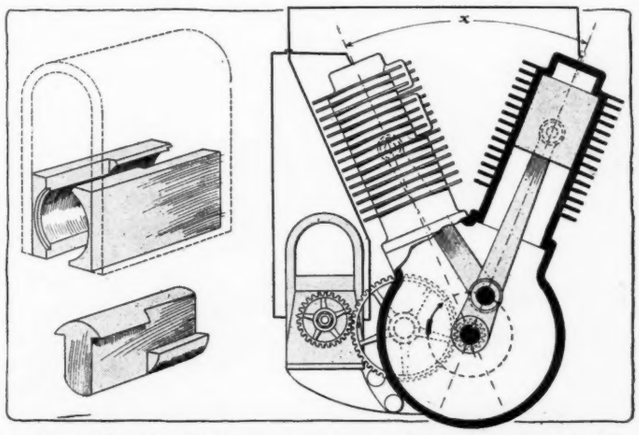


Fig. 4—Shaping of the armature and field in such a manner that the maximum spark is reduced and retarded in turns in every half revolution of the magneto armature so as to correspond with the requirements of a V-type engine—mounting of the Honold magneto

The Automobile

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Masquerading Freaks

THE present contest rules of the American Automobile Association permit any person to use a motor taken from one make of car, and a chassis from another and designate the car either by the name of the concern building the motor or the one building the chassis, or neither. This condition of affairs which arose over 3 years ago by racing enthusiasts, who wanted to develop what they considered a specially fast car, does an injustice to both the maker of the motor and the maker of the chassis. If the car is entered under the name of the maker of the motor and fails, that concern is credited with a failure, whereas the reason of failure may not have been in the motor but rather in the chassis parts.

This situation is not just, and while it may satisfy the private owner who wants to build up something in the speed creation field that he cannot purchase, it is an open question as to whether it should not be stopped. Nobody has any objection to a person buying a stock motor in one place, a gearbox from regular makers of such, and so with axles, frames and other parts and assembling them into a racing car and adding to it any name desired, but it is quite a different situation when a motor is taken from a certain make of car whose manufacturer does not sell motors, and where the axles are taken from another make of car whose maker manufactures his own axles, and so with the gearbox and other chassis essentials.

The Fifth Decimal Place

RECENTLY a leading British engineering company set out to produce a certain model of car, which with a given cylinder displacement was to carry a certain weight of body, was to develop a certain horsepower on the block and had to be able to travel a certain speed for a lap on Brooklands.

When the car was completed, tested out and ready to be launched as a new model, the official engine test showed a power of slightly more than one-half horsepower in excess of the stipulated figure, and when the car was tested on Brooklands its speed exceeded the required limit by a little over one-half mile per hour. Surely this is calculating factors to the fifth decimal place.

Such calculations were not guesswork and were not all made on paper. Many tests were carried out on the Brooklands to determine the loss due to wind resistance with different fender areas, with different radiator designs and with different windshields. The results obtained in these trials were incorporated into every part of the body, so that when it came to the final speed test, there was not any question about what would be lost in wind resistance. It had all been calculated in advance, and the previous calculations met the required mark.

The work that was used to determine wind resistance was duplicated in a different way in the factory, in the laboratory, and in the engineering and drafting departments. Every motor part was considered in relation to the completed car, and when the motor was assembled, run in and ready for its official test, it measured up as accurately to expectations as a man-of-war made for certain sustained speeds.

It takes more money to design motor cars along this fifth-place-of-decimals plan, but it is cheaper in the long run than the guessing manner. What is the value of building a most efficient motor and killing its performance with a body too heavy and one with too much wind area? All of the good efforts in motor design have been lost by a short-sighted policy in the body. Make the production of the body as careful a study as that of the motor, and do not overlook the fact that a complete car is made up of two essentials, the chassis and the body. The chassis is useless without the body and the body is of little value unless mounted on the chassis. As careful planning is needed in one as in the other. The chassis in its final test may measure up with the highest requirements of speed and acceleration, but when clothed with the body it is destined to carry around, it immediately becomes a differently performing piece of mechanism. The life may largely have departed from it, and instead of a car with good acceleration and well-sustained speeds it proves a signal failure.

Do not overlook wind resistance. There are many cars on the market that give satisfactory performance when the top is down and the upper half of the windshield lowered, but they are anything but satisfactory when driving against a stiff breeze with the windshield up and perhaps with the top up.

First S.A.E. Quarterly Meeting Ends

Eleven Active Sub-Committees Hold Discussions and Reports Favor a Few Variations in Practice—Only About 40 Specifications of S. A. E. Steel to Be Recommended—New Spring Clip Design to Be Submitted

NEW YORK CITY, April 9—The Society of Automobile Engineers has brought to a conclusion the first of its quarterly meetings of the Standards Committee. Heretofore the meetings of the Standards Committee have been held semi-annually just prior to the national meetings of the whole Society. The purpose of the new plan, which has been inaugurated during the administration of President Henry M. Leland, is to make possible broadening the scope of the standardization work which has met with such general approval including that of the car manufacturers.

During the convention of last week meetings of eleven of the active Divisions or sub-committees of the Standards Committee were held. Most of the reports made were of a "progress" nature. In fact none of the recommendations under consideration can, under the rules of the Society, be accepted by the Society officially until the recommendations have been made final and specific, approved by the Council and formally discussed at national meetings of the Society at which time votes are cast by the members having voting power on the acceptance of practice recommended in reports of Divisions of the Standards Committee.

Springs Division

The Springs Division, Harold L. Pope, Chairman, is formulating a table of axle clips for use on pleasure cars, with the idea of reducing the number of sizes and submitting a design of clip that will represent the best engineering practice. Correspondence is being conducted with axle and clip manufacturers with a view to securing complete data bearing on spring clip dimensions. Data have already been collected from a large number of automobile engineers showing the practice as to the diameter of spring clip shank with relation to the width of leaf springs and giving information as to the best methods of reducing to a minimum breakage of short plates of springs.

The Committee appeared to favor the use with center bolts of springs, of U. S. standard hexagon nuts tapped with S. A. E. screw standard thread. Also that nuts for spring clips have a length of one and a half times the diameter of the clip shank.

It is planned to hold another meeting of the Springs Division prior to the meeting of the Society to be held at Cape May commencing June 23.

Iron and Steel Division

The Iron and Steel division, Henry Souther, Chairman, checked carefully the minutes of its last meeting and considered and approved forms which will be used for securing in tabular and curve form data so far as possible as to the physical properties of S. A. E. steels.

The prospect is that the Iron and Steel division will recommend that about half of the previously accepted eighty specifications of S. A. E. steels be eliminated; also that in the case of some steels the previously accepted content of phosphorus and sulphur be raised.

Another meeting of the Iron and Steel division is scheduled to be held during the next 2 months.

Data Sheet Division

The Data Sheet division, B. D. Gray, Chairman, which has in charge the issuance of supplemental and superseding sheets for the S. A. E. Handbook of standards and recommended practices and general engineering data applicable to the automobile field, formulated recommendations as to methods of disseminating widely at nominal cost copies of the official version of S. A. E. practices.

The question of enlarging the present data book, so that curves could be reproduced in more detail, was taken up and it was decided the present book is of approximately the same size as other data books and is more convenient for use in drafting rooms and filing as well as more convenient for carrying, than a book of greater length and width would be. A great deal of matter thus far printed and to be printed in data sheet form can be put on the present size sheet to very good advantage and it does not seem desirable to provide large sheets for the comparatively small percentage of material which cannot be put conveniently on the present size sheet.

Motor Testing Division

Professor R. C. Carpenter, Professor J. A. Moyer and Mr. Herbert Chase attended the meeting of the Motor Testing division at which time the three motor testing forms submitted at the last meeting of the Society were further considered and it was decided to draw up a code for use in connection with the conduct of motor tests.

The Motor Testing division reported on standard forms of test reports, one form for manufacturers and another for research work, the latter to be much fuller. The purpose of this standardization is to give a ready means of comparison of the data sent in by different engineers. A standard method of procedure in testing was also suggested.

Miscellaneous Division

The Miscellaneous division, John G. Utz, Chairman, recently recommended the spark plug with larger hexagon head to permit the employment of larger porcelains without disturbing interchangeability with the previously accepted standard, the A. L. A. M. spark plug the name of which was changed to S. A. E. some years ago.

A complete table of dimensions of pins for S. A. E. standard rod and yoke ends was submitted.

Electrical Equipment Division

The Electrical Equipment division, A. L. Riker, Chairman, took up the matter of installing fuses in circuits from storage batteries as applied to both two-wire and single wire systems. A long discussion was also given to the best methods of controlling the rays of headlights in such a way as to insure comfortable and entirely safe country driving.

Nomenclature Division

The Nomenclature division, A. B. Cumner, Chairman, limited its proceedings to formal discussion as to the plan and scope of future activities to be entered upon. A vote was passed requesting the Council to instruct the various divisions of the Standards Committee to refer all questions involving nomenclature to the Nomenclature division for action. The division is co-operating with the Nomenclature Committee of the British Engineering Standards Committee, which is supported by the English government and represents the leading engineering societies and firms of Great Britain. Mr. Chas. Wheeler, a member of the Council of the Institution of Automobile Engineers who attended the last summer meeting of the S. A. E., is Chairman of the British Nomenclature Committee. A letter from him was read at the Standards Committee meeting announcing that he was sending for the consideration of the S. A. E. Nomenclature Division a list of words and phrases which is now under the consideration of his Committee.

The discussion following this report showed the need of a standard list of words for describing the various car parts. Mr. Marmon stated that the present confusion of terms caused endless trouble especially in the purchasing department. As an example, he mentioned that there are three words in common use referring to the pin at the upper end of the connecting rod: piston, gudgeon and wristpin. A good plan for the standardization of these names was suggested, namely; that the manufacturers be requested to send to the division their parts lists books, from a study of which the best term to use in describing a given part could be determined.

The Broaches Division, through its chairman, Mr. Spicer, reported that some progress had been made in four-spline practice.

An attempt will be made by the Ball and Roller Bearings division to minimize the number of roller bearing sizes. The

makers of these bearings will be written in order to determine the roller bearing sizes now manufactured by them.

Broaches Division

The Broaches division, C. W. Spicer, Chairman, considered a number of replies received in answer to queries propounded to about fifty automobile manufacturers as to what in their opinion should be recommended in connection with four-spline shafting. After a discussion extending over many months the Society at its last meeting accepted recommendations as to six and ten-spline practice with the shaft periphery divided into equal parts by the splines.

The present discussion as to four-spline practice is principally concerned with the division of the periphery. For equal division the arguments are:

1. Uniformity in general design with the six and ten-spline proportions.
2. In the milling operation already accepted there would be less material to be removed and surface to be covered, therefore less cost.
3. In the grinding operation there would be less surface to be covered, therefore less expense in manufacturing.
4. The shaft would be stiffer.

It is set forth that unequal division of the shaft periphery provides:

1. Larger bearing surface on the small diameter. This is especially important when auxiliary grooves are provided at the root of the spline of the shaft, which grooves are in some cases necessary in order to develop the necessary depth of straight surface on the side of the spline when the spline is developed by the hobbing process. The auxiliary groove is also of advantage when the small diameter of the shaft is finished by grinding as it obviates the necessity of grinding up into a sharp corner.
2. Lighter shaft.
3. Less material to be removed by the broach and therefore less expensive broaching operation.
4. Other things being equal, a gear or other part containing the broached hole would probably go out of shape in heat-treating somewhat less if provided with narrow slots than it would with the comparatively wide slots resulting from an equal division of the periphery.

The Broaches division is proceeding to prepare a design for four-spline shafting with the various arguments given in view.

Electric Vehicle Division

The meeting held last week was the first one of the Electric Vehicle division. The division proceeded with temporary organization being in consultation with delegates from the Electric Vehicle Association Standardization Committee. It was the sense of the meeting that the Society of Automobile Engineers should be requested to have more electric vehicle representatives on the different divisions of the Standards Committee where the work is common to both gasoline and electric vehicles.

The Electric Vehicle division announced that arrangements had been made for the co-operation of this branch of the Standards committee with the corresponding division of the E. V. A. A. and that the latter had agreed to turn over the results of all the work it had done to date.

Pleasure Car Wheels Division

The Pleasure Car Wheels division took under consideration the results of an extensive series of tests of rims conducted by Mr. E. R. Hall. It was thought that in view of these tests it had been demonstrated that the figures for deflection and permanent set of rims under specific test contained in the first report of the division, submitted at the meeting of the Standards Committee held in January last but referred back to committee, were justified.

The division expects to make recommendations which will reduce the commonly used sizes of pneumatic tires to twelve, in any event not more than sixteen. At the present time some of the tire companies are listing fifty different sizes.

The British standards of rim sections which are in force in Europe today and which it was reported had been approved by the Clincher Automobile Tire Manufacturers' Association for millimeter sizes (the American sizes being, of course, in inches), were considered. There were some apparent discrepancies in the stated tolerances from precise measurement of the British Standards upon which more information is being sought. It is the intention that there shall be ready for presentation at the next meeting of the Society a paper setting forth the difference in American and European practice in this regard.

A number of wheel makers attended the meeting of the Pleasure Car Wheels division to take part in the discussion of the possibility of standardizing wood wheel dimensions and felloe bands for pneumatic tires. A number of drawings and sketches were submitted to elucidate the subject, the situation as to which appears at this time to be that it is probably feasible to recommend two sets of dimensions which will cover the practice. It was hoped that one set of dimensions could be recommended as has been done by the Society in the case of solid tires but whether this can be done will be discussed in a paper to be presented at a later date.

Ball and Roller Bearings Division

The Ball and Roller Bearings division, Howard Marmon, Chairman, has started upon the task of reducing the number of stock sizes of roller bearings in the case of the so-called short sizes which are not interchangeable with the dimensions which have already been accepted for ball bearings.

S. A. E. Standards

S. A. E. Standards are almost generally used and reduce or simplify labor in the engineering, production and service departments. The money saving effected by the reduction in labor and the facilities with which materials can be secured can be estimated and is large. Members of the Society practically unanimously favor standardization along sound lines to a degree that will not hamper the individuality of the engineer. Recommended practices of the Society have been of incalculable benefit to the automobile industry at large.

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S. A. E. European Trip Drafted

NEW YORK CITY, April 14—A tentative draft of the itinerary of the Society of Automobile Engineers, whose members purpose visiting Europe during the coming Autumn for the purpose of attending Paris and Olympia shows and visiting many of the factories, has been drafted. The party made up of members of the S. A. E. and friends is expected to total between 75 and 100, and will sail from New York, October 9, 1 a. m. on the Crown Prinzessin Cecile, returning on the George Washington, November 22.

The European program includes a stop in Paris during the week of the Paris show followed by a circuit into Italy, Switzerland, Germany and Belgium, and lastly a week spent in London at the Olympia show.

The tentative itinerary follows:

October 9—Sail from New York.
October 15—Reach Paris. Headquarters Edward VII. Hotel.
October 16-20—Visiting Paris Show, and visits to the majority of the automobile and accessory factories in and around Paris.
October 21—Leave for Turin, Italy.
October 22—Turin. Arriving in morning, visiting factories and leave in evening.
October 23—Arrive at Milan and visit factories.
October 25—Leave Milan for Lucerne for sightseeing trip.
October 27—Leave Lucerne for Schaffhausen to visit factories.
October 28—Leave Schaffhausen for Stuttgart and visit factories.
October 30—Leave Stuttgart for Mayence.
October 31—Steamer trip on Rhine to Cologne.
November 1—In Cologne.
November 2—Short trip to Essen and return.
November 3—Leave Cologne for Brussels, Belgium.
November 4—In Brussels.
November 5—Leave Brussels for Antwerp and thence for London.
November 6-15—In London visiting Olympia show with side trips to many English factories.

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Research Division to Study Tap Sizes

NEW YORK CITY, April 13—On Tuesday, April 21, the Research Division of the Society of Automobile Engineers will meet at its headquarters at 1790 Broadway. One of the topics of discussion will be the investigation of drill sizes. The amount of money lost on the breakage of taps will be studied with a view to see what can be done to cut down this loss.

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Freight Congestion Before the E.V.A.A.

NEW YORK CITY, April 13—"The Effect of Power-Wagon Operation on Terminal Freight Congestion" is the title of a paper to be given April 24 by F. A. Hortter, the car accountant Boston & Maine Railroad, before the Electric Vehicle Assn. of America at the United Engineering Societies' Bldg., 29 West 39th Street, this city.

—

May Combine National Engineering Societies

NEW YORK CITY, April 10—At the annual meeting of the American Institute of Electrical Engineers, a paper was read and discussion took place on the subject of combining the membership, or parts thereof, of the National engineering societies in one association. The primary object might be sufficiently described as "To foster and develop the human factor in the engineering profession, to place the engineer on the same plane as the lawyer and doctor."

Underwriters Change Rates—High Premiums for Dealers

Trade and Pleasure Classes Sharply Defined—Twenty-Four States in South and West Affected

NEW YORK CITY, April 14—Dealers' cars may no longer be insured for fire and theft at pleasure car rates in the States of the West, Southwest and Southeast, according to new schedules adopted by the Automobile Underwriters' Conference and which become effective April 20; this is true even where short rate cancellation is provided and the limits of insurance named in the schedule are made mandatory.

The states which are included in the two departments and which are affected by the revised rates are:

Western Department

Ohio, Iowa, Wisconsin, Minnesota, Nebraska, Colorado, Kansas, Michigan, North Dakota, South Dakota, Indiana, New Mexico, Illinois, Wyoming.

Southeastern Department

Virginia, Alabama, Oklahoma, Arkansas, Mississippi, Georgia, Florida, Louisiana, North Carolina, South Carolina.

The complete revised schedules for the two departments follow:

WESTERN DEPARTMENT

On gasoline power private pleasure motor cars and commercial vehicles, such as trucks, delivery wagons, based on manufacturers' original list prices:

	Class A	Class B	Class C
Limits of amount of insurance include equipment but not additional bodies. See additional equipment and additional bodies rules below	$3,500 and over	$1,500 to $3,499	$700 to $1,499
This and Next Year Models—Insure for not to exceed actual cost or less than 50% of original list price	1.50%	1.75%	2.00%
Last Year Models—Class A, amount of insurance at option of company; Class B, not more than 70% of original price; Class C, not more than 60% of original list price	1.50%	2.00%	3.00%
Year Before Last Models—Class A, amount of insurance at option of company; Class B, not more than 50% of original list price; Class C, not more than 40% of original list price	2.25%	3.50%	4.00%
Minimum premium	....	....	$15
Three-Year-Old and Older Models—Class A, amount of insurance at option of company; Class B, not more than 30% of original list price; Class C, not more than 20% of original list price	2.75%	4.50%	5.00%
Minimum premium	....	$15	$10

Note.—Exceptional cases may arise where car is well owned and is in very good physical condition where limits on "three-year-old and older models" are not sufficient. In such case refer to company, with full particulars, when slightly increased amounts may be allowed, but in no case to exceed 40 per cent. of original list price.

Reduction.—A reduction of 50c. from above rates will be allowed for attachment of "non-valued ex-theft and automatic reinstatement" indorsement by use of clause furnished you for that purpose.

CARS LISTING LESS THAN $700

	Rate	Minimum premium
Fire and theft	3.25%	$12.50
This and next year—		
Fire only	1.50%	7.50
Fire and theft	3.25%	12.50
Last year and older—Fire only	3.00%	10.00

ELECTRIC MOTOR CARS

Rate for full form of fire and theft floater (all models)	1¼%
Rate for restricted form	1 %

DEALERS' MOTOR CARS.

	Fire and theft floater	Restricted floater
New gasoline cars—		
List price $3,500 or over	2.25%	2.00%
List price $1,500 to $3,499	2.50%	2.25%
List price less than $1,500	2.75%	2.50%
Electric Cars	2.00%	1.75%
Steam cars	3.00%	2.75%

No risk accepted where boiler and burner are located in rear of dashboard. Second-hand cars, 1 per cent. additional rate must be charged. Pro rata cancellation allowed with a minimum charge of $1.

SOUTHEASTERN DEPARTMENT

Rates for the full form of policy, gasoline pleasure and commercial type cars:

	Class A	Class B	Class C
Original list price of motor cars when new, excluding cost of additional equipment and extra bodies	$3,500 and over	$1,500 to $3,499	$1,499 and less
This and Next Year Models—insure for not more than actual cost	2½%	2½%	2½%
Last Year Models—Insure Class A for not more than 80%; Class B for not more than 60%, and Class C for not more than 50% of list price	2½%	3%	3%
Year Before Last Models—Insure Class A for not more than 70%; Class B for not more than 50%, and Class C for not more than 40% of list price	3%	3¼%	3½%
Three-Year-Old Models—Insure Class A for not more than 60%; Class B for not more than 30%, and Class C for not more than 20% of list price	3¼%	4%	5%

Note.—Second-hand cars, charge ½ per cent. in addition to above rates.

Electric Cars.—Models of all years, 2 per cent.; second-hand cars, charge ½ per cent. in addition to above rate. Maximum insurance amounts at the option of underwriter.

Taxicabs, Livery and Renting Motor Cars.—All risks of this kind must be submitted to the home office. If approved, will be written at not less than 1 per cent., in addition to schedule rates, subject to the following indorsement:

"In consideration of $..... additional premium, permission is hereby granted for the automobile herein insured to be used for carrying passengers for a compensation, provided it is under the personal supervision and guidance of the assured or a chauffeur in his employ while being so used."

RATES FOR THE RESTRICTED FORM OF POLICY

(The theft and reinstatement features excluded from the full policy by attaching the indorsement provided for that purpose.)

Electric Cars, Taxicabs, Livery and Renting Cars, Gasoline Pleasure and Commercial Cars.—A reduction of ½ per cent. allowed from the rates for the full term of policy.

MINIMUM PREMIUM

For the full form of policy	$12.50
For the restricted form of policy	10.00

DEALERS' MOTOR CARS

Rates for full form of policy:

New gasoline cars—	
Listing for $3,500 and over	2¾%
Listing for $1,500 to $3,499	3%
Listing for $1,499 and less	3¼%
New electric cars, all models	2%
New steam cars, all models	3½%

(Subject to 1¼% reduction if boiler and burner are located in front of dashboard.)

For second-hand and rented cars charge 1 per cent. in addition to above rates. Pro rata cancellations allowed with a minimum charge of $1 except on cars listing for $1,499 and less the minimum charge is 50c. Amounts of insurance at option of underwriter.

Rates for the Restricted Form of Policy.—A reduction of ¼ per cent. is allowed from the above dealers' rate for the elimination from the full policy of the theft and reinstatement features. Minimum premium same as above.

Fire Extinguishing Devices.—A reduction of 15 per cent. of the premium is allowed if a device approved by the Underwriters' Laboratories of the National Board of Fire Underwriters is carried on the car and an indorsement provided for that purpose is attached to the policy. This reduction, however, is not allowed on additional premiums for the theft full coverage, collision sustained and property damage.

European Privilege.—At an additional rate of 1½ per cent, policies may be extended to cover a European trip under the form of indorsements provided for that purpose. If the risk of the transatlantic trip, going and returning, be eliminated, this privilege can be granted without extra charge.

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Packard Sales Grow 40 Per Cent.

NEW YORK CITY, April 9—The Packard M. C. Co., sales for the 7 months to April 1 were 40 per cent. ahead of last year. Truck sales are somewhat smaller than a year ago. The company has decided to close its shipping season on June 30. No cars whatever will be shipped out of the factories during July and August. In previous years July and August have been important contributors to the year's overturn. But the company, for trade reasons, has decided to rearrange its yearly cycle, shipping its products in 10 months and creating a selling vacuum of 2 months, to get its wind and go ahead with the production of the next year. Its immediate effect will be to cut down the gross and net results of the current fiscal period and swell the earnings of the 1914-15 year.

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Entz Corp. Incorporates for $3,000,000

NEW YORK CITY, April 13—The Entz Motor Car Corp., this city, has been incorporated for $3,000,000 to produce a number of cars featuring the Entz transmission. The incorporators are Adolph Widder, W. B. Harding and R. H. Montgomery. It is understood that R. M. Owen will assume the presidency and that Roy Ranney will become vice-president. The company is at present working on the first batch of cars at its laboratory established several months ago at 136 West Fifty-second Street, this city. These cars have six-cylinder motors, one size with cylinders measuring 4 by 5.5 and another with cylinders 3.63 by 5 inches. They have a wheelbase of 130 inches and five-passenger bodies. The description of the transmission was given in the January 8, 1914, issue of THE AUTOMOBILE.

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Singer Co. Incorporated for $175,000

NEW YORK CITY, April 15—The Singer Motor Co. has been incorporated for $175,000 to build a 90 horsepower six-cylinder car. A description of this car was given in THE AUTOMOBILE of March 19. The incorporators are C. A. Singer, C. A. Singer, Jr., and H. R. Callisen.

Motometer Sues Stewart-Warner for Infringement

Asks Perpetual Injunction Be Granted—Prays for Accounting—Device Shows Cooling Water Temperature

NEW YORK CITY, April 14—Harrison H. Boyce and the Motometer Co., Inc., have brought suit in the U. S. District Court, Southern District of New York, charging the Stewart-Warner Speedometer Corp., of New York, with infringement or threatened infringement of Letters Patent No. 1,090,776, covering the Motometer, a device for showing the cooling water temperature. This patent was applied for January 3, 1913, and granted March 17, 1914. The plaintiffs aver that the Stewart-Warner Speedometer Corp., of Chicago, and incorporated under the laws of Virginia, and the New York corporation stand in the relation of manufacturer and sales agent, but the Chicago corporation is not made a party to the suit as it does not come under the jurisdiction of the New York court.

The plaintiffs claim that the Stewart-Warner Corp., by false representations induced the plaintiffs to disclose all the important secrets pertaining to the plaintiffs' apparatus and business, and further that the defendant "has threatened to make or cause to be made, or to use, or cause to be used, or to sell, or cause to be sold" a device embodying the invention covered by the plaintiffs' patent.

The plaintiffs state that the device of which they complain operates in a manner similar to that described in the patent in suit and is intended to produce the same result. They further claim that the device is "of inferior design, construction and workmanship to the plaintiffs' device and which the plaintiffs are informed and believe will not be durable in service and will fail to operate in the proper manner or give satisfaction to purchasers thereof." The plaintiffs also claim that advertising leaflets sent out by the defendant contain untrue and derogatory statements concerning the quality, character or efficiency of the plaintiffs' apparatus.

The plaintiffs pray for a perpetual injunction, a temporary injunction against further proceeding in the alleged threatened acts of infringement, an accounting of profits and damages, and that the damages assessed, if any, be tripled and for the costs of the suit.

On September 12, 1912, Harrison H. Boyce, the inventor of the device covered in patent No. 1,090,776, sold to George H. Townsend, II., then of New Haven, Conn., and now of Bronxville, N. Y., an exclusive license to make, use and sell his invention throughout the United States, its dependencies and all foreign countries. By the terms of this agreement Townsend had the right to assign this license to a corporation to be organized by him within 30 days to market this invention. He specified the Motometer Co., Inc., of which Townsend is president, by a document dated April 9, 1914. The plaintiffs pray that these agreements and the copy of the patent be taken as part of the bill of complaint.

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Universal Rim Co. to Start Patent Suits

CHICAGO, ILL., April 13—Following the purchase of the Dorian Rim Co.'s demountable rim patents by the Universal Rim Co. of Chicago, a renewed period of activity will be entered into by the Universal Rim Co. The patents purchased include those of Funk and Anglada Nos. 1,041,062, 1,064,066 and 1,087,628 and some patent applications. It is stated that the Universal Rim Co. expects to have granted on May 5, ten patents covering the rim situation very thoroughly. These were applied for during 1908, 1909, 1910 and 1911. These new patents together with the patents purchased and those now held by the Universal company will give the latter concern a very strong hold on the rim situation. It is stated that action will be started against at least four concerns which are said to infringe patents controlled by the Universal company.

The patent number 1,041,062, granted to Richard W. Funk, Weehawken, N. J., Oct. 15, 1912, relates to a temporary locking piece for transversely split clincher rims. The locking piece, A, Fig. 1, holds the ends of the rim together. The ends of this locking piece are forked and are designed to fit into four holes, B, in the rim. This piece is slipped into place by bowing it and when in position it assumes its normal shape again. The other Funk patent granted, June 10, 1913, relates to a vehicle wheel rim, Fig. 2, and has been assigned to R. W. Funk, Inc., New York City. The fixed part of the rim to which the spokes are attached is U-shaped and is designated by C. Equally spaced about this U member are opposing pairs of flanges which are bolted to it and which carry the rim itself.

The patent number 1,087,628, granted to Joseph A. Anglada, assignor to the Anglada Company, Michigan, relates to a demountable rim, Fig. 3, comprising a circular band or felloe holding equally spaced lugs D, which engage with clips on the rim. The lugs are forced into engagement by means of an eccentric mechanism. The eccentric actuates a block that engages a projection on the rim. The contacting surfaces between the block and eccentric are beveled and are locked in place.

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Kantalever Case Settled Out of Court

NEW YORK CITY, April 13—The Motor Car Equipment Co., sales agent for the Kantalever emergency spring repairer and sole owner of the basic patent, has come to an agreement with William Wooster trading under the name of the Auto Surplus Stock Syndicate. The Motor Car Equipment Co. brought action February 19 against the defendant for infringement of patent 902,250 issued to D. P. Power, October 27, 1908, covering the Kantalever emergency spring repairer. As the defendant failed to answer, a decree was taken *pro confesso* by the Court in U. S. District Court, Southern District of New York.

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Buffalo Concern Sues Heinze Electric

BUFFALO, N. Y., April 13—The Frontier Specialty Co. of Buffalo, N. Y., manufacturers of the All in One and Czar priming spark plugs and owners of U. S. letters patent 642,167 Simms dated January 30, 1900, and 915,896 Shea dated March 23, 1909, have filed suit in the United States District Court for the Southern Division of the Eastern District of Michigan against the Heinze Electric Co., for the infringement of United States Letters Patent, 642,-167, granted January 30, 1900, to Frederick Richard Simms and for the infringement of trade rights of the Frontier Specialty Co. Additional bills of complaint are being prepared by Parsons, Hall & Bodell, of Syracuse, N. Y., who have been retained by the Frontier Specialty Co. as attorneys to prosecute infringers of its patents, and it is expected that these bills will be completed forthwith and filed within the next few days.

The Simms Patent, No. 642,167, taken out by Frederick R. Simms, deals with a spark plug designed to produce a heavy spark for starting a cold motor. A priming cock is fitted on the top of the plug and a hollow core leads the priming fluid directly to the sparking points at the bottom of the plug.

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Weed Decree Against Fox Co.—No Damages

NEW YORK CITY, April 10—The Weed Chain Tire Grip Co., H. D. Weed and the Parsons Non-Skid Co., Ltd. have received a perpetual injunction in its suit against the Fox Metallic Tire Belt Co., F. A. Fox and J. P. Hopson for infringement of its basic patent No. 723,299 issued March 24, 1903, to Harry Parsons.

In addition to enjoining the Fox company from making or selling any tire chain grips, infringing the Weed patent, and particularly the Fox chain grips, the Court ordered that the complainants, having waived their rights to collect damages, profits and costs, no provision be made for recovery of these.

This complaint was brought October 8, 1909, in the U. S. Circuit Court, Second Circuit, Eastern District of New York.

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Klaxon Enjoins National Supply Co.

NEW YORK CITY, April 14—A final injunction was granted yesterday to the Lovell-McConnell Mfg. Co., in its suit against the National Auto Supply Co. in the U. S. District Court, Southern District of New York. The plaintiff brought suit charging infringement of its patents No. 923,048, 923,049 and 923,122 all issued May 25, 1909 to Miller Reese Hutchinson. Patent No. 923,048 covers a mechanically actuated diaphragm horn and the claims at issue were 16, 17, 19, 24, 27, 29, 36 and 37. The Court ruled that the defendant had infringed these.

Patent No. 923,049 covers a cam operated horn, the claims at issue being, 1, 2, 3, 8, 12, 13, 22 and 30, the Court ruling that the defendant had infringed these claims.

A mechanically actuated diaphragm horn is covered by patent No. 923,122, the claims at issue being 1, 2, 3, 4, 5, 6, 7, 8, 9, 13, 14, 15, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 35, 36, 37, 38, 45, 47, 48, 52 and 53. These claims were also infringed by the defendant.

A United States marshall endeavored to find the officers of the National Auto Supply Co. to serve the final injunction but reported that he was unable to do so. A new corporation had been formed with new officers doing business at 77 Chambers street, but none of the officers of this corporation were in town.

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MILWAUKEE, WIS., April 11—The circuit court at Milwaukee has given a decision that the municipality is not legally responsible for damages by reason of the injury of a pedestrian caused by a municipally-owned motor car, even if the driver of the car is at the time performing public duties. The driver is thus held to be responsible to defend any suits arising out of such injury. The case involved a motor vehicle used by the police and fire alarm telegraph system.

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Knox Property to Be Sold April 24

SPRINGFIELD, MASS., April 14—The plant, machinery, materials, etc., of the bankrupt Knox Automobile Co. will be sold on April 24, 1914, at public auction on the steps of the Hampden County Court House in this city. C. G. Gardner is the trustee. It has been agreed among the directors of the company that any person or corporation buying the plant may assume the name of the Knox Automobile Co. or any other name similar thereto.

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Motor Truck Club Meets

NEW YORK CITY, April 15—The regular meeting of the Motor Truck Club for April was held tonight at the Automobile Club of America. The subject for discussion was "Insurance and Its Bearing on Motor Trucks." The following were the speakers and their subdivisions of the topic: "The History and Aim of Insurance" by W. D. Reid; "The Employers' Liability Law and Its Effect on Motor Truck and Garage Operation," by W. I. Payne, of Payne & Ramsey; "The Scientific Basis of Rates and Its Relation to Adjustments," by Edmund Ely.

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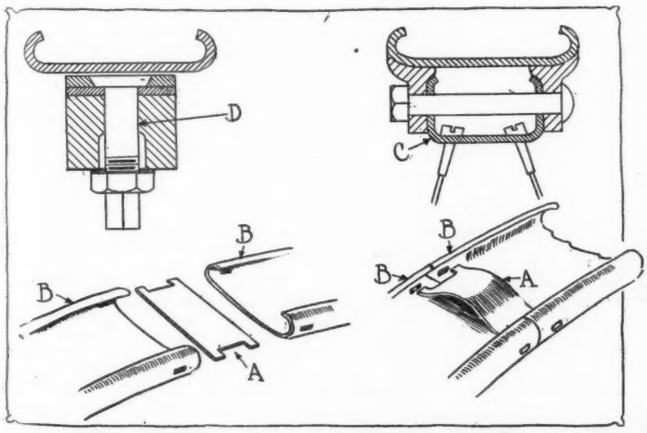
Searle Unburstable Tubes Tested

NEW YORK CITY, April 15—For the purpose of showing that the Searle unburstable inner tube will stand up under severe usage a test was conducted yesterday when thirteen taxicabs, each equipped with two Searle tubes in covers that were useless for ordinary tubes, ran from the Hotel Astor, Forty-fourth street, New York, to Garden City, L. I., and back, the tubes holding up perfectly. Blow-outs in the covers, both in walls and in treads, in some cases showed several inches of bare tube, and where the covers did not seem quite bad enough they were perforated with a number of holes about the size of a silver dollar just above the beading. The only suggestion of tire trouble occurred when a broken bottle reached a bare tube through a big hole in the casing, causing a puncture. The Searle tube is made in England by the Searle Unburstable Inner Tube Co., Ltd., Birmingham. The tube will be manufactured and marketed here shortly.



Universal rim patents. Fig. 1—Lower, left—Temporary locking piece for split rims. Fig. 2—Upper, right—U-shaped rim. Fig. 3—Upper, left—Demountable rim

Unlighted Cars at Curbing Not Unlawful, Says Court

Decision from Iowa Supreme Bench Declares Car Standing at Night Can Not Be Penalized

DES MOINES, IA., April 13—Lights are not required on standing automobiles at night. Such is the recent ruling of the Iowa Supreme Court in the case of the City of Harlan vs. N. G. Kraschel.

The Court holds that an automobile left standing on the streets of a town or city is not being operated or driven and does not come under the requirements of city ordinances governing lights. Attorneys for the city contended that a car left standing should display two lights in front and one in the rear. In his opinion, Justice Evans says:

"A standing car is not in the ordinary sense being operated or driven, neither is it proceeding in any direction. There is no more reason why a standing motor car should display lights than any other vehicle."

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Walpole Interests Fail to Agree

BOSTON, MASS., April 9.—With two rival committees in the field soliciting support for two radically different plans of reorganization, some of the Walpole Tire & Rubber stockholders are naturally a bit bewildered. For some time the two interests, one the reorganization committee represented by C. G. Metzler, and the other the two stockholders' committees, have been endeavoring to get together on a plan of reorganization. They were unable to agree, however, with the result that the two factions are now competing for the support of shareholders.

Under a recent court order the property of the Walpole company must be sold by May 11. It is understood that the Metzler reorganization committee has already definitely decided to put in a bid. The proposed capitalization of the reorganized company, under the two plans, compares:

	Metzler committee	Stockholders' committees
Preferred stock	$1,813,000	$1,250,000
Common stock	1,500,000	2,500,000
Total	$3,313,000	$3,750,000

Each share present preferred receives:

Metzler plan.	Stockholders' plan.
Share new pfd. on payment of $25.	To assenting pfd. holders, right to substitute to 50 per cent. new pfd., carrying bonus 100 per cent. new common. Non-assenting, receive 50 per cent. new common.
Share new common on payment of $12.50.	

Each share present common receives:

Right to substitute to share new pfd., carrying bonus one share new common, for every fifteen now held.

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Prest-O-Lite Wins Against Searchlight

CHICAGO, ILL., April 15—*Special Telegram*—A Prest-O-Lite victory was recorded here yesterday when the United States Court of Appeals for the seventh district decided in favor of the Indianapolis concern in its suit against the Searchlight Gas Co., of Chicago, upholding Prest-O-Lite and enjoining Searchlight from refilling Prest-O-Lite tanks. This is taken as a final decision in the matter, although a motion for a rehearing could be made. As interpreted, this means that the Searchlight company has the right to refill tanks, "only on condition that the alteration of the tanks be complete and permanent."

According to the court, to remove the Prest-O-Lite trademark and other wording on the newer tanks makes them unsafe, but since the tanks are not all marked this way, the ones first made, which only had the trademark etched can be so altered permanently that this will not conflict with Judge Baker's ruling, it is claimed. This decision was handed down by the United States Circuit Court of Appeals after 2 years of litigation, Judges Baker, Seaman and Kohlsaat sitting. It was Judge Baker who delivered the decision and the gist of it is found in the following:

"Appellant is enjoined from recharging Presto-O-Lite tanks without completely removing and permanently obliterating from the said tanks the said trademark, Prest-O-Lite." Appellee stamps the mark into the metal so that appellant finds great difficulty in obliterating the mark completely and permanently without danger of making the tank unusable. The limit was reached in permitting appellant under any circumstances to make over Presto-O-Lite tanks into Searchlight tanks and permission can stand only on condition that the alteration be complete and permanent."

Freight Dock Delays Shown at Interstate Board Hearing

Railroads and Steamship Lines Charged with Breach of Duty in Failing to Deliver Legally

NEW YORK CITY, April 10—Delays in loading and unloading operations at the freight terminals on New York City's river front have become so intolerable to the merchants of New York that they have called the railroads and steamship lines to account for alleged discrimination and failure to make legal delivery of goods at the terminals. At 6.30 tonight a hearing before the Interstate Commerce Commission, which began on Monday last, came to a close, after perhaps the greatest amount of valuable testimony ever taken had been given by the witnesses.

This case, like a similar one pending in Philadelphia, is one of a series being brought up by the National Team Owners' Association, through the various local organizations. The complaint was made in Philadelphia by the Philadelphia Team Owners' Association against twenty-three common carriers in that city, and in New York City against a larger number. The allegations were in brief:

"That the defendants do not perform their full duty as common carriers of freight for hire, or the full service for which they exact and receive from shippers, compensation, in that they do not make a proper and complete delivery at their terminals and in that they discriminate between persons and places."

In other words, it is claimed that the common carriers in New York City are not making legal delivery. Legal delivery is the placing of the goods by the carrier in a reasonable time, in a proper manner and in a proper place. The law requires the carrier to deliver the goods in a reasonable time, regardless of whether the consignment is large or small. It is alleged that discrimination is made against the consignees of small shipments in this matter. It requires that the goods be piled in such a manner as to be conveniently and readily accessible, that the goods of one consignment be not superimposed over those of another, and that the addresses and names be placed outward, so as to be read from the aisle. It requires that aisles of sufficient width to allow of ready and convenient access be left by which a passage is afforded to all sections in which the goods are piled. It requires that the consignments be assembled as far as possible.

The complainants demand that all consignees be afforded the opportunity either to bring the loading gates of their vehicles to the goods, without unavoidable delay, or that the terminals make tail-board delivery.

In defense, the railways and steamship companies stated that there was insufficient room to allow of providing tail-board delivery, and that the cost would be higher.

Market Report of the Week

Prices in this week's markets were unchanged with a few exceptions. Copper went down $0.00 1-5 while tin went down as a result of cables received from London reporting a decline there. The consuming demand here was very limited. Tin closed at $36.60 at a small drop of $0.10 for the week. Lead is very quiet but steady at $3.80 per 100 pounds. Kansas petroleum came down $0.10 per barrel due to over production with predictions of a still lowering in price, possibly down to $0.50 a barrel. Rapeseed oil came down $0.09. There was an absence of new developments in the Brazilian grades of rubber. Fine Up-River Para remained constant at $0.74.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.05¾	.05¾	.05¾	.05¾	.05¾	.05¾	.....
Beams & Channels, 100 lbs.	1.31	1.31	1.31	.131	1.31	1.31	.....
Bessemer Steel, ton	21.00	21.00	21.00	21.00	21.00	21.00	.....
Copper, Elec. lb.	.14⅜	.14⅜	.14⅜	.14⅜	.14½	.14⅜	— .00½
Copper, Lake, lb.	.14¾	.14¾	.14¾	.14¾	.14¾	.14¾	.....
Cottonseed Oil, bbl.	7.56	7.54	7.54	7.53	7.56	7.55	+ .01
Cyanide, Potash, lb.	.17	.17	.17	.17	.17	.17	.....
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	.....
Gasoline, Auto, bbl.	.16	.16	.16	.16	.16	.16	.....
Lard Oil, prime	.93	.93	.93	.93	.93	.93	.....
Lead, 100 lbs.	3.80	3.80	3.80	3.80	3.80	3.80	.....
Linseed Oil	.54	.54	.54	.54	.54	.54	.....
Open-Hearth Steel, ton	21.00	21.00	21.00	21.00	21.00	21.00	.....
Petroleum, bbl., Kans., crude	1.00	1.00	1.00	.95	.90	.90	— .10
Petroleum, bbl., Pa., crude	2.50	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined	.59	.59	.59	.59	.59	.50	— .09
Rubber, Fine Up-River, Para	.74	.74	.74	.74	.74	.74	.....
Silk, raw Ital.	....	5.10	....	....	5.10	5.10	.....
Silk, raw Japan	....	4.25	....	....	4.25	4.28	+ .03
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	36.70	37.00	37.00	37.00	36.95	36.60	— .10
Tire Scrap	.04½	.04½	.04½	.04½	.04½	.04½	.....

G.M.C. Profits May Show $10,000,000

NEW YORK CITY, April 13—The splendid manner in which General Motors gross sales and net earnings have been running for the last 8 months makes it within the range of probability that the full year to July 31 next will show the total of $10,000,000 of net profits. This would mean a balance for the $16,500,000 common of slightly better than 50 per cent., against 39 per cent. in the 1913 year and 17.4 per cent. in 1912.

It is understood that gross sales so far this year are about $6,000,000 ahead of last. It is increased efficiency and economy of operation, however, which are building up net profits this year. The expansion in gross sales promises to be only 25 per cent. to 30 per cent. as large as the $20,000,000 gain in 1913 over the previous year. A gross of about $90,000,000 is indicated by results to date.

Anti-Price-Cutting Bill—May Select Customers

WASHINGTON, D. C., April 15—Representative H. L. Clayton, of Alabama, introduced in the House yesterday the revised Anti-Trust bill. Section 2 of this bill particularly affects the automobile world. In this section it states that any person engaged in commerce who shall discriminate in price between different purchasers of commodities with the purpose or intent to injure or destroy the business of a competitor shall be deemed guilty of a misdemeanor; but there is nothing contained in the article preventing persons from selecting their own customers.

Rubber Goods Directors Re-elected

NEW YORK CITY, April 13—At the annual meeting of the Rubber Goods Mfg. Co., the retiring directors were re-elected. The following are the new directors: W. S. Ballou, N. F. Brady, S. P. Colt, F. W. Eddy, J. B. Ford, Ernest Hopkinson, C. A. Hunter, Lester Leland, R. B. Price, H. E. Sawyer and E. S. Williams.

NEW YORK CITY, April 10—At the Board of Directors meeting held April 10 in the association's offices, New York City, the following concerns were elected to membership in the Motor and Accessory Manufacturers Assn.:

T. P. Howell & Co., manufacturers of patent and enameled leather for automobiles, etc., Newark, N. J.

The Perfection Spring Co., manufacturer of automobile springs, Cleveland, Ohio.

Pittsburgh Steel Products Co., manufacturer of seamless cold drawn steel tubing, Frick Annex, Pittsburgh, Pa.

The Bosch Magneto Co., manufacturer of magnetos, New York City, was also reinstated to membership.

Crawford Is Haynes General Manager

KOKOMO, IND., April 13—Robert Crawford, for some time past advertising manager of the Haynes Automobile Company, Kokomo, Ind., has been promoted to general sales manager, vice George H. Strout resigned. S. A. Merinbaum, formerly assistant to Mr. Crawford, has been placed in charge of the advertising department.

Kelly-Springfield to Retire Bonds

NEW YORK CITY, April 13—Directors of the Kelly-Springfield Tire Co. have taken preliminary steps in a plan for the retirement of the 4 per cent. income debenture bonds of the company by issuing therefor a like amount par value of 6 per cent. cumulative preferred stock on a basis of one share of stock for each $100 face value of the bonds; also a plan for refunding the 78.5 per cent. of dividend accumulated upon the present issue of 6 per cent. preferred stock by the issuance of 7 per cent. cumulative second preferred

stock, each share, if authorized, to be converted into one share of common stock at the option of the holder at any time before July 1, 1924.

A special meeting of the stockholders will be called May 4, to take action on the plan, and to authorize the increase in the preferred stock, and the increase of common stock which will be reserved to take care of the conversion privilege of the second preferred stock. The plan is to become operative only if in the opinion of the directors a sufficient amount of bonds are deposited and offered for exchange.

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Fisk Annual Report Out

BOSTON, MASS., April 13—The Fisk Rubber Co. reports the following statement of its condition as of October 31, 1913: Assets, real estate, $48,325; machinery and equipment, $1,900,627; manufacturing merchandise material and stock in process, $2,672,721; cash and debts receivable, $1,689,141; deferred charges, $72,073; good will, trade marks and patent rights, $8,000,000; total, $14,382,887.

Liabilities, capital stock, $13,000,000; accounts payable, $1,145,825; reserve for contingency, $50,000; surplus, $187,062; total, $14,382,887.

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New Paige-Detroit Agent for N. Y.

NEW YORK CITY, April 13—The Paige-Detroit Co. of New York City has been reorganized. C. M. Kohn and S. Wise, president and vice-president of the old company, have resigned. The company is now controlled by E. M. Dalley and L. C. Dalley, the former being the new president and the latter secretary and treasurer. W. M. Turner is the new sales manager and vice-president.

Mr. Turner, who recently returned from the Detroit plant, states that the factory production in the new Paige plant has been raised to sixty cars a day.

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Pardee to Handle Car-Nation and Keeton

NEW YORK CITY, April 14—Colonel K. C. Pardee is again in the automobile field. The American Voiturette Co. of New York has been incorporated for $6,000 to handle the Car-Nation and the Keeton cars with the Colonel as supervisor. The incorporators are H. A. Foote, A. E. Villard and F. V. Wishart.

A service station has been secured. This is the Gotham Garage, 102 W. Forty-sixth street. This is also going to be used as a shipping center to dealers. The territory controlled by this company will be the northern half of New Jersey, the eastern half of New York and the western half of Connecticut, besides the Metropolitan district and Long Island.

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Women Admitted to A. C. A. Membership

NEW YORK CITY, April 15—At the annual meeting of the Automobile Club of America, last night, women were admitted to active membership of the club, by unanimous vote. This is the first time in the history of motoring that women have received the same privileges as the male members. All privileges are given, except the power to vote and an equity in the club property.

Automobile Securities Quotations

New York City, April 15—During the past week there was comparatively little activity in the automobile securities market. Nearly all of the stocks experienced slight fluctuations due to market conditions. General Motors common registered a gain of 6 1-4 points during the week and Lozier common gained 9 points. These were the only increases worthy of note and were both due in some measure to reports of increased earnings of these companies. Oils were weak again, both the Texas company and Vacuum Oil experiencing some loss, the latter company's stock dropping 6 points. Stewart-Warner common dropped 5 as did also Goodyear common, these losses being simply due to stock fluctuations. The complete daily figures for the past week follow:

	Wednesday		Thursday		Friday		Saturday		Monday		Tuesday		Week's	1913	
Security	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Change	Bid	Asked
Ajax-Grieb Rubber Co. com	200	..	200	..	200	..	200	..	200	..	200	..	..	150	165
Ajax-Grieb Rubber Co. pfd	99	102	99	102	99	102	99	102	99	102	99	102	..	93	99
Aluminum Castings pfd	98	100	98	100	98	100	98	100	98	100	98	100	..	98	100
J. I. Case T. M. Co	82½	87	82½	86½	82½	86½	82½	86½	82½	86½	82½	86½	..	..	..
Chalmers Motor Co. com	88½	88	82½	88	82½	88	82½	88	82½	88	82½	86½	..	125	132
Chalmers Motor Co. pfd	..	83	..	83	..	83	..	83	..	83	90	92½	..	98	102
Electric Storage Battery Co	51¼	52	51	51⅝	51	51⅝	51¼	51¾	51¼	51¾	51	52	—¼	..	..
Firestone Tire & Rubber Co. com	280	285	280	285	280	285	280	285	280	285	280	287	..	265	270
Firestone Tire & Rubber Co. pfd	107½	109	107½	109	107½	109	107½	109	107½	109	107	109	—½	104½	106
Garford Co. pfd	80	90	80	90	80	90	80	90	80	90	80	90	..	99	101
General Motors Co. com	76¼	77	77⅞	78	77⅞	78½	77⅞	78½	77⅞	78½	81½	82	+6¼	30½	33
General Motors Co. pfd	92	92½	92¼	92½	92¼	92½	92¼	92½	92¼	92½	92¾	93½	—¾	75	76
B. F. Goodrich Co. com	26	26¼	25½	26½	25½	26½	25	26	25	26	25½	26	—1¼	34	35
B. F. Goodrich pfd	88	88¾	88	88¾	88	88¾	88	88¾	88	88¾	86½	89½	—1½	95	96
Goodyear Tire & Rubber Co. com	165	170	165	170	165	170	165	170	165	170	160	170	—5	300	..
Goodyear Tire & Rubber Co. pfd	96	99	96	99	96	99	96	99	96	99	95	96½	—1	100	102
Gray & Davis Co. pfd	90	97	90	97	90	97	90	97	90	97	90	97	..	..	..
International Motor Co. com	..	5	..	5	..	5	..	5	..	5	..	5	..	5	10
International Motor Co. pfd	..	15	..	15	..	15	..	15	..	15	..	15	..	25	40
Kelly Springfield Tire Co. com	57	59	57	59	57	59	57	59	57	59	57	59	..	..	..
Kelly Springfield Tire Co. pfd	135	140	135	140	135	140	135	140	135	140	135	145	..	..	..
Lozier Motor Co. com	19	..	19	..	19	..	28	33	28	33	28	33	+9	..	..
Lozier Motor Co. pfd	..	65	..	65	..	65	..	65	..	65	..	65	..	..	..
Maxwell Motor Co. com	7	7½	8	8½	8	8½	7¼	8	7¼	8	7½	8½	+½	5	10
Maxwell Motor Co. 1st pfd	34	35	34	35	34	35	34	35	34	35	32½	33½	—1½	55	70
Maxwell Motor Co. 2d pfd	11½	12	12	13	12	13	12	13	12	13	11¾	12¼	+¼	20	30
Miller Rubber Co	135	140	135	140	135	140	135	140	135	140	135	140	..	160	170
New Departure Mfg. Co. com	122	123	122	123	122	123	122	123	122	123	123	125	+1	..	..
New Departure Mfg. Co. pfd	105	106	105	106	105	106	105	106	105	106	104	106	—1	..	..
Packard Motor Co. com	103	..	103	..	103	..	103	..	103	..	103	..	..	..	..
Packard Motor Co. pfd	94	98	94	98	94	98	94	98	94	98	94	98	..	98	103
Peerless Motor Co. com	15	..	15	..	15	..	15	..	15	..	15	..	..	35	45
Peerless Motor Co. pfd	..	75	..	75	..	75	..	75	..	75	..	75	..	95	100
Pope Mfg. Co. com	2	5	2	5	2	5	2	5	2	5	1	2	—1	19	22
Pope Mfg. Co. pfd	12	15	12	15	12	15	12	15	12	15	10	15	—2	60	65
Portage Rubber Co. com	..	25	..	25	..	25	..	25	..	25	..	25	..	38	42
Portage Rubber Co. pfd	..	75	..	75	..	75	..	75	..	75	..	75	..	90	94
*Reo Motor Truck Co	7	8¼	7	8¼	7	8¼	7	8¼	7	8¼	7¾	8¾	+¾	11½	12½
*Reo Motor Car Co	19¼	19¾	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19½	20¾	+¼	21	22
Rubber Goods Mfg. Co. pfd	40	50	40	50	40	50	40	50	40	50	40	50	..	..	..
Russell Motor Co. com	60	61	60	61	60	61	60	61	60	61	60	61	..	..	..
Russell Motor Co. pfd	100	102	100	102	100	102	100	102	100	102	100	102	..	..	..
Splitdorf Electric Co. pfd	40	50	40	50	40	50	40	50	40	50	40	50	..	..	..
Stewart Warner Speed'ter Corp. com.	60	61	60	61	60	61	60	61	60	61	55	60	—5	..	..
Stewart Warner Speed'ter Corp. pfd.	100	102	100	102	100	102	100	102	100	102	100	102	..	..	..
Studebaker Co. com	32	32½	32	32½	32	32½	32	32½	32	32½	33	33½	—1	29½	31
Studebaker Co. pfd	85	86½	86	87	85	87	85	87	85	87	85	87	..	90	93
Swinehart Tire & Rubber Co	60	65	60	65	60	65	60	65	60	65	60	65	..	87	91
Texas Company	143½	144	141¾	142¾	141¾	142¾	141⅛	142	140	141	140	141	—3½	..	..
U. S. Rubber Co. com	60½	60¾	60½	61	60½	61	59½	60½	59½	60½	60	60½	—1	66	66½
U. S. Rubber Co. 1st pfd	103⅞	104	103⅞	104½	103⅞	104½	103⅞	104½	103⅞	104½	103¾	104	—¼	108	108¾
Vacuum Oil Co	230	233	226	229	226	229	226	229	226	229	224	227	—6	..	..
White Co. pfd	107	110	107	110	107	110	107	110	107	110	107	110	..	107½	109
Willys-Overland Co. com	65	67	64	66	64	66	64	66	64	66	64	66	—1	63	68
Willys-Overland Co. pfd	89	94	89	93	89	93	89	93	89	93	89	94	..	90	98

*The par value of these stocks is $10; all others $100.

41 in French Grand Prix—Lists Close—Car Features

Entries More Profuse and International than Usual — Sunbeam and Delage Have New Valve Design

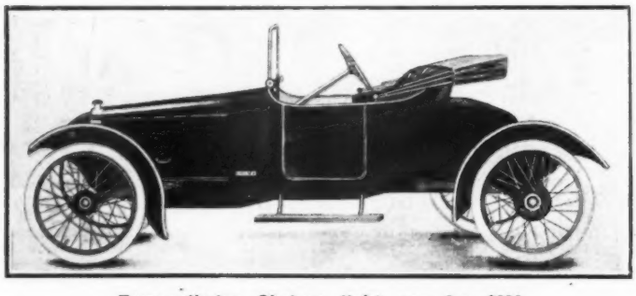
PARIS, April 4—Lists closed for the French Grand Prix race, with forty-one cars inscribed. This is the greatest number obtained for any recent contest in France, and is also the most international. France has twelve cars, Italy eleven, Germany eight, England six, Belgium two, Switzerland two. Nazzaro and Cæzar, both Italian firms, put in a car each at double fees. The full list, which cannot undergo any modifications, for the make-up of the race is definitely settled, is as follows:

FRANCE:		GERMANY:	
Delage	Albert Guyot	Mercedes	Louis Wagner
Delage	Bablot	Mercedes	Lautenschlager
Delage	Arthur Duray	Mercedes	Salzer
Peugeot	Georges Boillot	Mercedes	Pilette
Peugeot	Jules Goux	Mercedes	Nagel
Peugeot	Victor Rigal	Opel	Joerns
Alda	Tabuteau	Opel	
Alda	Petit	Opel	
Alda		ENGLAND:	
Schneider	Champoiseau	Sunbeam	Jean Chassagne
Schneider	Gabriel	Sunbeam	Darius Resta
Schneider	Croquet	Sunbeam	K. Lee Guinness
ITALY:		Vauxhall	J. Hancock
Fiat	Cagno	Vauxhall	Leslie Munro
Fiat	Fagnano	Vauxhall	W. Watson
Fiat	Scales	BELGIUM:	
Nazzaro	Felice Nazzaro	Nagant	Elskamp
Nazzaro	Porporato	Nagant	Esser
Nazzaro	Minoia	SWITZERLAND:	
Aquila-Italiana	Beria d'Argentina	Piccard-Pictet	
Aquila-Italiana	Marsaglia	Piccard-Pictet	
Aquila-Italiana	Costantini		
Caezar			
Caezar			

Several of the Grand Prix racing cars are already on the road. The first of the Peugeots went out this week. The Delage machines are being assembled after having undergone complete bench tests. The Sunbeam drivers will put their first machine through its road tests in the neighborhood of Lyons during the middle of the month.

Peugeot Has Brakes on All Wheels

In general features Peugeot has adhered to last year's design, maintaining sixteen overhead valves with direct operating overhead camshafts, and the distinctive type of lubrication with the entire oil supply outside the engine. The new motors have two magnetos firing simultaneously. The novelty of the Peugeot cars is the fitting of front wheel brakes. When Georges Boillot made an examination of the course he came to the conclusion that an unusually high efficiency set of brakes would be necessary in order to win the race. One of the legs of the course is straight, the second is slightly winding, and third is cut on the face of the mountain and has 45 distinct turns in a distance of less than 10 miles. Trials were made with a powerful Isotta-Fraschini car fitted with front wheel brakes. The result was so satisfactory that the Peugeot racing department decided to make use of brakes on all four wheels. Boillot declares that he can approach turns at a much higher speed than is possible with any other kind of brakes, thus saving several seconds per lap, and that the car is under more complete control than with brakes on the rear wheels only. Even when braking furiously there is no tendency for the car to skid across the road. This is an important feature, for on the most difficult portion of the Lyons course the drivers have a vertical wall on the right and a clear drop on the left. All other firms are paying close attention to brakes, but Peugeot appears to be the only one applying them to the front wheels.



Four-cylinder Chelsea light car for $390

Delage has modified his previous year's design in the matter of valves. In place of sixteen horizontal valves, his block motors have sixteen valves inclined in the head and operated direct by overhead camshafts, each one carried in an aluminum housing and driven by bevel gearing and vertical shaft in front of the motor. Ball-bearing crankshaft is made use of as in previous year's models, and the lubrication remains the same with increased facilities for cooling the oil.

Sunbeam has also modified the valve design. Instead of a six-cylinder L-type motor used in the previous Continental races, Engineer Coatalen has designed a monobloc engine with four cylinders having sixteen valves inclined in the head and directly actuated by two overhead camshafts, the design abolishing the use of rocker arms. The motors have a bore and stroke of 94 by 160 mm., this giving the maximum cylinder area allowed under the rules.

The valve-in-the-head type motor will undoubtedly predominate in this race. It is already known that it has been adopted by Sunbeam, Delage, Peugeot, Nazzaro, Fiat, Nagant, Alda and Mercedes. The design varies considerably, but the preference is for what is known as the Peugeot type with sixteen inclined valves and separate overhead camshafts, practically attacking the valves direct. Under this system the tappets are combined with the cams, the rocker arms, which have always been a source of trouble and have prevented the highest motor speeds, being abolished. Piccard-Pictet will run with single sleeve valve motors built under Argyll license.

Indiana Tour Routes Discussed

INDIANAPOLIS, IND., April 11—Officers were elected and plans for the annual run discussed at the annual meeting of the Indiana Automobile Manufacturers' Association held in Indianapolis, April 9.

The new officers are: President, R. P. Henderson of the Henderson Motor Car Co.; vice-president, W. B. Harding of the G & J Tire Co.; secretary, Joseph M. Ward of the United States Tire and Rubber Co.; treasurer, Guy O. Simons, of the Motor Car Mfg. Co.; directors, Mr. Henderson, Mr. Simons, George M. Dickson of the National Motor Vehicle Company and Howard Marmon of the Nordyke & Marmon Co.

The association, which gave the Four States run in 1912 and the Indiana to the Pacific tour last year, has two routes under consideration for this year's run. One of these is through Iowa, Nebraska and Minnesota. The other is through Kentucky and Tennessee to the southern trail, or west to St. Louis and then south to the trail which would be followed into Texas.

Wants Sanction for Seattle Speedway Races

CHICAGO, ILL., April 13—Frank G. Lowry is in Chicago on his way to New York where he intends securing from the American Automobile Assn. a sanction for a meet on the new Seattle speedway which is scheduled for July 18-19 and for which a purse of $15,000 will be offered.

Lowry announces that he has been made vice-president and general manager of the new track, work on which starts tomorrow. J. J. Henry is president; Charles Wisner, treasurer; C. E. Johnson, secretary and Howard Hughes, legal adviser. It is a different project than the one which was announced several months ago. It is to be located at the Meadows, 5 miles from the heart of Seattle's business district. Five railroads run to it and there is a fine motor road also leading to it.

The track is to be only 1 1-4 mile in length and will be built with a concrete base and an asphaltum surface. The turns will be banked 7 feet and the grandstands for the first meet will be capable of accommodating 25,000.

$6,125 in Accessory Prizes for Indianapolis

NEW YORK CITY, April 15—To date, $3,600 has been offered by five accessory manufacturers to the winner of the Indianapolis 500-mile race, using their accessories exclusively. The total prize money from the accessory people, including first, second and third places in the race, amounts to $6,125. These five concerns are the Emil Grossman Co., this city, Bosch Magneto Co., this city, Rudge-Whitworth, Ltd., Coventry, Eng., Wheeler & Schebler, Indianapolis, Ind., and Findeisen & Kropf, Chicago, Ill.

The $20,000 offered by the Indianapolis Motor Speedway Co. added to the accessory companies offers to the winner,

amounts to $26,125. The trophies offered are the Remy Grand Brassard and trophy, the Prest-O-Lite trophy, the Wheeler & Schebler cup and the Rayfield silver punch bowl, valued at $2,000.

The total prize offers, including the $50,000 from the Speedway company, amount to $56,125, to date. It is expected that a few other concerns will come forth with cash prizes.

There is a movement on foot to have the A. A. A. contest board take control of the accessory prize situation and insist that all companies offering prizes to winners must post same with the referee of the race a week in advance, or with the Contest Board representative. In turn the Contest Board will have its technical committee make an official report based on inspection both before and after the race.

New Alkaline Battery in Halifax

NEW YORK CITY, April 13—Messrs. Worsnop & Co., Halifax, Eng., are manufacturing an alkaline battery under the name of the Alklum Accumulator. In this battery the plates are made up of thin sheets of perforated nickel which serve to hold the electrolite. Oxyhydrate of nickel and graphite is used for the positive and an alloy of iron and cadmium for the negative. The active material is sandwiched between two of the nickel plates, the whole being then passed through a rolling mill which closes up the sides. A ten-cell battery gives when charged a total voltage of about 14. The battery is rated at 30 ampere hours and the normal charging rate at 7 amperes for 7 hours. The exterior dimensions of the battery box are 13 by 12 by 10 inches and the weight 59 pounds. The battery is presumably intended for a 12-volt circuit and is made in two types, one for lighting and the other for starting.

LONDON, ENG., April 11—In line with the growing popularity of American cars abroad, the Packard Motor Car Co. of Paris has established a branch office, service station and rental depot in London. The new establishment is located at No. 7 Lower Belgrave street, off Buckingham Palace road. In response to requests for rental service by tourists at the Riviera during the winter season, a station has been established at Nice.

NEW YORK CITY, April 13—The board of directors of the Automobile Dealers' Assn. held a meeting recently and elected to membership the Marmon company of New York, to be represented by F. G. Carrie. S. S. Toback was appointed to represent A. Elliott Ranney Co. in place of A. M. Day, who resigned. G. H. Smith was appointed to represent the Peerless company in place of Jack Clark. The Studebaker Co.'s membership was changed to the Phelps M. C. Corp., to be represented by George Phelps. The membership of Carl H. Page & Co. was changed to the Chalmers M. C. Co., of New York, to be represented by G. H. Stowe.

Saxon Car on Novel Endurance Run

DETROIT, MICH., April 14—A new kind of endurance run is under way in the city of Detroit. A Saxon light car is each day grinding out 135 miles of a total run of 4,050 miles, or a distance equal to the mileage from New York to San Francisco—and all within the city limits. The route traverses several of the city streets and boulevards and covers 12 miles. From the Pontchartrain hotel, the car goes south on Woodward avenue to Jefferson avenue, then east to Grand Boulevard, around this thoroughfare to Woodward again, then south to the starting point. It checks in at the hotel on each trip. The run is to last for 30 consecutive days, and eleven circuits per day are to be made. Each round trip consumes 40 minutes.

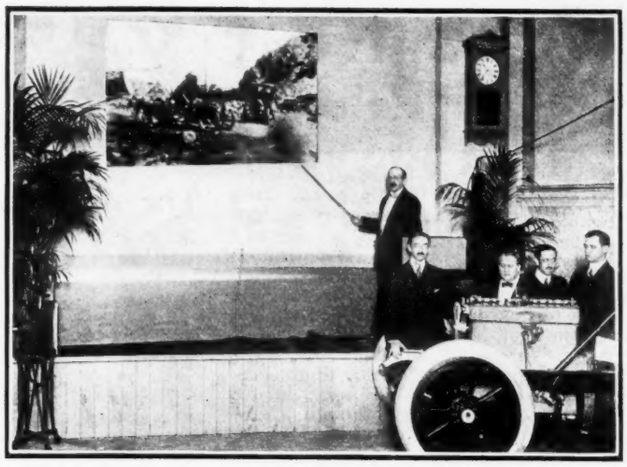
Tonight the car checked in at the end of its sixth day with 810 miles to its credit.

Chelsea $390 Light Car Announced

NEWARK, N. J., April 14—The Chelsea Mfg. Co., of this city has been incorporated to manufacture the Chelsea light speedster selling at $390. As far back as 1908 the maker of the Chelsea conceived the idea of a light car and for over a year has been testing out and improving a model which would effectually fill the gap between the automobile and the motorcycle.

The motor, clutch and transmission form a compact unit. The motor is of the long stroke type, four-cylinder, four-cycle, water-cooled by the thermo-syphon system. It has a bore of 2.75 and a stroke of 4 inches, giving about 18 horsepower. It has an aeroplane type ball bearing fan at the front of the motor, the carbureter is of standard design, float feed, ignition is by magneto. The foolproof and hill-proof system of lubrication insures positive oiling at all times, according to the designer.

The cone clutch is leather faced and has pick-up springs under the leather. Selective sliding gear transmission is used. The rear axle is semi-floating, while the front axle is tubular. Wire wheels are stock equipment. The standard 56-inch tread is used. The body is the streamline pattern seating the passengers side by side. The wheelbase is 102 inches.



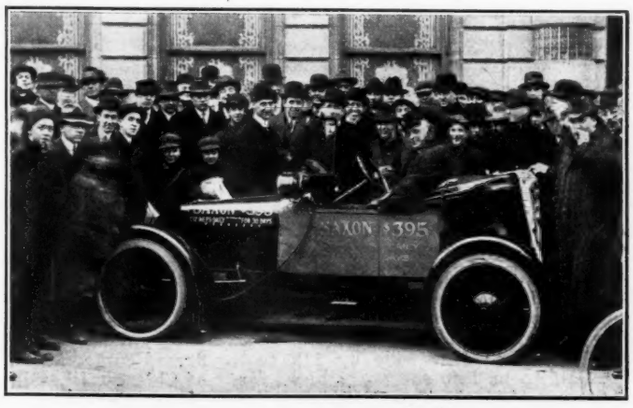
Moving pictures of Premier coast-to-coast tour

Dealers' Movie Show a Success

NEW YORK CITY, April 13—The recent moving picture show held by Partridge, Clark & Kerrigan, Inc., in their new salesrooms at W. Fifty-sixth street, proved to be a success in the way of drawing attention to the new firm and its cars, the Premier and Briscoe. At 8:30 p. m., the Indianapolis Speedway race of 2 years ago was run off. After this film, T. Francis Moore took the platform and lectured on the coast-to-coast tour of the twelve Premier car owners. Following this lecture, Darwin Hanhauer, an engineer, lectured on the Weidely motor. Several slides were used to illustrate, but most of the illustrating was done with a sectional model of the motor. The members of the company are E. S. Partridge, president; J. A. Clark, vice-president; J. J. Kerrigan, secretary, and M. J. Swetland, treasurer.

Swedish Car Sells for $800

NEW YORK CITY, April 13.—Cables from Stockholm state that determined effort is being made by Swedish interests to challenge the pre-eminence of American automobiles in that market. A new Swedish company with strong financial backing is erecting large factories at Norrkoping, which is called Sweden's Birmingham. It will make a specialty of a 20-horsepower car which will be sold at less than $800, in direct competition with the American cars. The cars will be ready for the market in the autumn.



Saxon light car on 4,050-mile endurance run

Factory Miscellany

FORD Plant in Winnipeg—A large automobile assembling plant, employing 500 to 1,000 people, will probably be built in Winnipeg or just outside the city by the Ford Motor Co., of Detroit, Mich., shortly, as the number of cars sold each year in the Canadian west, is, officials say, increasing rapidly. In round numbers the Ford company expects to sell 4,000 of its machines in Winnipeg and the west during 1914. In all likelihood, although a site has not yet been decided upon, a large plot in the west end of the city will be chosen. Several sites are now contemplated by the Ford people. The reasons for the location of an assembling plant in Winnipeg by the Ford concern are twofold. An assembling plant there would mean that the $40 freight now charged on each car which is fully set up at Ontario factory and shipped west, not more than four or five in each freight car, would be eliminated. The separated parts would be shipped to that city and the machine would then be set up at the Winnipeg plant. It can readily be seen that parts to 100 or more automobiles can be packed in one freight car, making scarcely a comparison between the cost of the freight of a "set up" car and one "knocked down." The other big factor in the erection of the plant in Winnipeg in preference to any other city in the Canadian west is the cheap power to be obtained there. With but few exceptions Winnipeg has the cheapest electrical rates of any city on the continent. A telegram has been received from the Ford Canadian factory at Walkerville. It was a reply to a query sent by the *Free Press*, asking whether the company contemplated building an assembling plant at Winnipeg. The telegram stated that such a building was contemplated for this city, but the details had not yet been worked out.

Thomas Spring Co. Plant Burned—The factory of the Thomas Cycle Car Spring Co., Hornell, N. Y., was damaged this week by an explosion to the extent of $1,000.

Pharis Will Run Double Shift—The Pharis Rubber Co., Chillicothe, O., announces that within the next 30 days the company will be running a double shift of 100 men.

Dodge Bros. Build—Dodge Bros., Detroit, manufacturers of automobiles and accessories, have awarded contracts for the construction of a four-story reinforced concrete factory building to be used mainly as a woodworking shop.

International Wheel Builds—The International Wheel Co., Nashville, Tenn., which was recently incorporated with $10,000 capitalization, will erect a plant for the manufacture of a new automobile wheel. Alexander Haas is president.

Consolidated Rubber's Warehouse—The Consolidated Rubber Co., Ltd., will erect a $40,000 warehouse on Broad street north, Regina, Sask. The building proposed is 100 feet wide by 113 feet long, half to be left one story high, for the present, but the foundation will be designed to carry a much larger building in the future.

The Automobile Calendar

April 12-19	Prague, Austria, Eleventh Annual International Auto Exhibition, Royal Tiergarten.
April 18	Phoenix, Ariz., Race Meet, Maricopa Automobile Club.
April 21	New York City, S. A. E., Research Division Meeting.
April 23-24	New York City Dealer's Business Demonstration, Motor Dealers Contest Assn.
May 2-27	Tulsa, Okla., Ozark Trails Good Roads Convention.
May 5	New York City, S. A. E., Electrical Equipment Division Meeting.
May 9	Atlanta, Ga., Third Annual Hill Climb, Atlanta Auto & Accessory Assn.
May 12	New York City, S. A. E., Ball and Roller Bearings Division Meeting.
May 14	New York City, S. A. E., Motor Testing Division Meeting.
May 25-26	Palermo, Sicily, Targa Florio, 700-Mile Race.
May 28-30	Chambersburg, Pa., Trys over Lincoln Way from Chambersburg to Pittsburgh, Chambersburg Motor Club.
May 30	Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.
June 1	Palermo, Sicily, Coupe Florio, 279-Mile Race.
June 17-18	Fayette Co., Pa., Second Annual Hill Climb, National Pike.
June 18	Uniontown, Pa., Hill Climb, Auto Club of Fayette Co.
June 23-26	S. A. E. Summer Meeting, Cape May, N. J., Cape May Hotel.
June 24-26	Chicago, Ill., Seventh Annual Meeting of Nat. Gas Engine Assn.
June 27-July 4	A. A. A. Touring Week.
June 30	London, Eng., Fourth International Rubber and Allied Industries Congress.
July 3-4	Tacoma, Wash., Montamara Festo Races, Tacoma Speedway Assn.
July 4	Sioux City, Iowa, 300-Mile Race, Sioux City Auto Club and Speedway Assn.
July 4	Lyons, France, French Grand Prix.
July 13-14	Seattle, Wash., Track Races, Seattle Speedway Assn.
July 25-26	Belgium Grand Prix Road Races.
Aug. 21-22	Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Aug. 23	Auvergne, France, Coupe de l'Auto Race.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 26-Oct. 6	Berlin, Germany, Automobile Show.
Oct. 9-Nov. 2	S. A. E. Europe Trip.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
November	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
November 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
November 15	Paris, France, Kerosene Motor Competition.

May Use Columbia Plant—An unconfirmed rumor has it that Sears, Roebuck of Chicago, Ill., will occupy the Columbia Motor Car plant, Hartford, Conn., and manufacture a billing machine. This factory is of approximately 240,000 square feet of floor space and has been closed down for some time. It is on the market for sale.

Mercer Has To Use Tent—As a result of the great demand for its product, the Mercer Automobile Co., Trenton, N. J., has had to erect a large tent to relieve congested manufacturing conditions. Until permanent additions can be made to the factory buildings, a tent measuring 90 by 150 is to be used for some of the final operations of chassis assembly.

The tent was secured from the Robbins Circus, which has been wintering in Trenton. Several large additions were made to the Mercer plant only a few months ago, and it was thought this would give sufficient room for some time to come, but these new buildings have been rapidly outgrown.

McNeill Tire Will Build—The McNeill Auto Tire Co., Toledo, O., manufacturer of automobile tires, is planning a factory.

Johnston's $200,000 Plant—The Johnston Motor Co., recently organized with a capital stock of $1,000,000, has plans for a factory at Fort Erie, Ont. The building will be of brick and steel, and will cost, including equipment, about $200,000. D. J. Johnston, Toronto, Ont., is manager.

American Bronze Adds—The American Bronze Co., Berwyn, Pa., manufacturer of non-gran bearing bronze, is enlarging its works, which will increase the capacity of its finishing department about 75 per cent., and increase the capacity of its foundry department about 40 per cent. The company has also just erected and equipped a testing and experimental laboratory, where daily tests of its product and research work will be conducted.

Big Grant Shipments—Carload shipments left Findlay from the factory of the Grant Motor Co., last week for Great Britain and Australia. Ten carloads in one shipment to Whiting, Ltd., of London, and seven carloads to San Francisco, Cal., for Australia will be followed within a week by a shipment of twenty-five carloads for the London dealers. Foreign countries have been demanding larger and larger shipments constantly according to George S. Waite, sales manager of the company. The last week of March saw 200 cars shipped and during April the weekly average is being increased.

Ford Assembling Plant in Cleveland—The location of a large assembling plant for the Ford Motor Co., at Euclid avenue and East 117th street, Cleveland, O., is said to be contingent upon the granting of a permit by the city to run an overhead spur of the Belt Line railroad across East 117th street to accommodate the plant. Negotiations for a location of an assembling plant in Cleveland began several months ago and it was stated the branch would be one of the largest and most important of the company's chain. Cleveland is the distributing point of a large territory and about 4500 Ford cars were sold from the company's branch, 4400 Euclid avenue, last year. The allotment of cars for the present year is said to be 7000.

The Week in the Industry

Motor Men in New Roles

BASTABLE Goes to Chicago—T. A. Bastable, formerly manager of the service department of the Motz Tire & Rubber Co., Akron, O., has joined the sales force of the company's Chicago branch. He will devote his time to sales promotion in the electric tire field.

Knight Resigns—W. C. Knight has resigned from the Stewart-Warner Speedometer Corp., Detroit, Mich.

Holton Empire Sales Manager—Hoover Holton has become sales manager of the Empire Automobile Sales Co., of Canada, London, Ont.

Mullen Succeeds Binford—Charles A. Mullen has recently succeeded J. S. Binford as general sales agent for the Savage Tire Co., in Los Angeles.

Dorsey Makes Change—A. H. Dorsey has been appointed manager of the Detroit sales and service station of the Anderson Electric Car Co., maker of the Detroit electric.

Amson Joins Norwalk Tire—F. L. Amson, formerly with the B. F. Goodrich Co., has gone with W. B. Miller, in the new Norwalk Tire & Rubber Co., Winnipauk, Conn. He is secretary and treasurer of the company.

Schwer Heads Hinde & Dauch—George W. Schwer, vice-president of the Ohio Motor Co., will become head of the new Hinde & Dauch Co., to occupy the plant of the defunct Sandusky Auto Parts and Motor Truck Co., Sandusky, O. This company makes tractors.

Smith Resigns—Harold Smith has resigned as secretary and purchasing agent of the Racine Mfg. Co., Racine, Wis. He will become vice-president of the B. G. & M. Mfg. Co., Chicago, Ill., manufacturer of aluminum castings, metal stampings and brass castings, and jobber in machine work.

Burnett in New Capacity—L. C. Burnett, 7 years with the Peckham Motor Car Co., Dayton, O., and later factory representative for the Haynes Automobile Co., has been appointed superintendent of service for the Frederick E. Murphy Automobile Co. J. L. Jordan, former manager in the Northwest for the Goodyear Tire & Rubber Co., has joined the Murphy company also.

Hodgkins Joins Studebaker—R. T. Hodgkins has been appointed assistant sales manager of the Studebaker Corp., the appointment having been made at a meeting of the Studebaker officials in New York City last week. He was formerly connected with the Yale & Towne Mfg. Co. and about a year and a half ago succeeded E. L. Kuhn as New York manager of the vehicle department of the Studebaker Corp.

Boyden Locates in Indianapolis—Charles Boyden, formerly chief engineer of the American Motors Co., and who recently associated in a like capacity with the Electrical Engineering and Storage Battery Co., of Sandy Hook, Conn., has temporarily made headquarters in Indianapolis. For special automobile development and constructional work for manufacturers this location is particularly central.

Penbrook Goes to Missouri—A. P. Penbrook, former sales manager of the Buick Chicago branch, is now Kansas City, Mo., manager of the Oakland branch. Mr. Penbrook formerly lived in Kansas City, and is thoroughly familiar with the Southwest, for which this city is the distributing center. He succeeds J. F. Walsh, factory representative of the Oakland company, who was temporarily in charge of the local company. Mr. Walsh will not sever his connections with that company.

Sales Manager Hurlburt Truck—R. S. de Mitkiewicz, who was associated with the automobile sales department of the American Locomotive Co. until its discontinuance, announces his affiliation as sales manager with the Hurlburt Motor Truck Co., 569 Fifth avenue, New York City. Mr. de Mitkiewicz has been selling motor trucks in New York City since 1899 and has been directly connected with the automobile industry since leaving college, starting with the original firm of Smith & Mabley.

Garage and Dealers' Field

Take Columb Tire Agency—Paulin & Panneton, Montreal, Que., have taken on the Columb tire agency.

Imperial Agency Moves—The Imperial Motor Car Co., Boston, Mass., has moved into new quarters on Commonwealth avenue.

Knight Tire's Detroit Branch—The Knight Rubber Co. has opened a branch house at 580 Woodward avenue, Detroit, Mich.

Two New Motz Agencies—The Boss Rubber Co., Denver, Col., distributor in Colorado of Motz cushion tires, has opened branches in Colorado Springs and Pueblo.

Benz Agency Move—The Benz Automobile Sales Cor. will move on May 1 to its new quarters, 1700 Broadway, N. Y. City, where it will have an exhibition of all the models of Benz cars.

Take Republic Tire Agencies.—W. D. Boyer, of Lancaster, O., has taken the Lancaster, O., agency for Republic tires. The Wedge Garage, Zanesville, O., has also taken the agency for Republic tires.

New Batavia Tire Agents—The Pasadena Rubber Supply Co., Pasadena, Cal., and the Long Beach Motor Supply Co., Long Beach, Cal., have been named as distributors of Batavia tires at those points.

Marion Retail Branch Opens—The Marion Motor Car Co., Indianapolis, Ind., has opened a retail sales branch in that city at 343 North Capitol avenue. The branch has been placed in charge of Edgar Updyke and S. A. Glover, who will be assisted by H. B. Millspaugh and J. L. Hensell.

Will Handle Ford Accessories—The Frazier Auto Parts Co., Kansas City, Mo., has been organized here to handle the line of Ford accessories made by the Auto Parts Co., of Hartford, Conn. Quarters have been taken at 1912 Grand Avenue and a repair shop, exclusively for work on Ford cars, will be opened.

May Motor in Yellowstone Park—Two thousand automobiles will journey to Gardiner, Mont., the gateway to the Yellowstone Park, and one terminus of the Yellowstone Park Trail, next summer when the Trail Association meets at Hunter's Hot Springs. The automobiles cannot get into the park, but if the plans of the Trail Association are carried out, they will make this pilgrimage to protest. It is planned to have the concourse of machines photographed, with the sign "Let Us In," prominently displayed.

More Non-Gran Users—The American Bronze Co. has added the Packard to the already long list of leading cars which use Non-Gran bearing bronze. The Maxwell Motor Co. is another of the latest converts to the Non-Gran idea. The new Maxwell racing cars are being equipped with Non-Gran. Among other large orders recently placed with the American Bronze Co. are the contracts for supplying the Burke Electric Co., Erie, Pa., and The Temco Electric Motor Company of Leipsic, O., with Non-Gran bearings and bushings.

Repair Shop for Rolls-Royce Cars—Claude Johnson, the general managing director of the Rolls-Royce Co., Ltd., has set on foot the establishment in New York of a repair shop exclusively for cars of that British make, a number of which are now owned in this city and vicinity. The shop will be manned by mechanics who have been trained at the factory in Derby, England, and it will be furnished with a very complete stock of parts. Another repair shop with a smaller stock of parts is about to be established also at Toronto. A service system is to be established as well. Inspectors from Derby are traveling at present through the United States and Canada. The head of the new organization is James Royce of Toronto.

New Bosch Supply Stations—The Bosch Magneto Co. has recently added to its list the following supply stations: Motor Supply & Tire Co., Akron, O.; George W. Roberts Electric Works, Marysville, Cal.; Albany Garage Co., Albany, N. Y.; Minot Auto Co., Minot, N. D.; Augusta Garage, Augusta, Me.; J. P. Gayle Supply Co., Newport News, Va.; Bangor Motor Co., Bangor, Me.; Port Washington Garage, Port Washington, N. Y.; Bath Auto & Gas Engine Co., Bath, Me.; Provo Machine & Foundry Co., Provo, Utah; Motor Supply & Tire Co., Cleveland, O.; St. Albans Foundry Garage, St. Albans, Vt.; Troy Automobile Exchange, Cohoes, N. Y.; Jensen Bros. Auto Co., Santa Cruz, Cal.; Motor Supply & Tire Co., Columbus, O.; Gavin-Williams Co., San Diego, Cal.; Warren Garage, Elkhart, Ind.; Troy Automobile Exchange, Troy, N. Y.; Pearce Street Garage, Gloucester, Mass.; Utica Cycle Co., Carroll Building, Utica, N. Y.; Blair Motor Co., Logan, Utah; Morgan & Williams Co., Warren, O.; Court Motor Car Co., Marietta, O., and the Brass City Auto Co., Waterbury, Conn.

Automobile Agencies Recently Established

PASSENGER CARS

Place	Car	Agent
Aberdeen, Minn.	Maxwell	Payne Auto Co.
Absarokee, Mont.	Maxwell	Stillwater Trading Co.
Ainsworth, Nebr.	Maxwell	Syfert Garage
Akron, Ia.	Hupmobile	E. E. Mellen
Albany, Ill.	Kisselkar	J. W. Dinneen
Albany, N. Y.	Maxwell	C. S. Ranson
Alcester, S. D.	Hupmobile	C. A. Frost
Alfred, N. D.	Maxwell	Klundt Co.
Allentown, Pa.	Maxwell	Krause Auto Co.
Alton, Ill.	Metz	O. Rosseau
Amer. Fork, Utah.	Maxwell	W. A. Devey
Ames, Ia.	Maxwell	M. A. Miller
Anita, Ia.	Hupmobile	L. R. Galiher
Appleton, Minn.	Kisselkar	Appleton Auto Co.
Appleton, Wis.	Oakland	H. E. Griffin Auto Co.
Appleton, City, Mo.	Maxwell	Browning Bros.
Athens, Wis.	Maxwell	Athens Auto Co.
Atlantic, Ia.	Maxwell	Garside Weitzel
Archbold, O.	Reo	J. H. Nofzinger
Arlington, Nebr.	Auburn	Fred Menking
Ashland, Nebr.	Studebaker	M. W. Urch
Ashtabula, O.	Oakland	Geo. H. Fassett
Athens, Ga.	Maxwell	C. B. Griffith
Athens, O.	Hupmobile	F. E. Goldsberry
Atkinson, Nebr.	Hupmobile	W. H. Hitchcock
Audubon, Ia.	Jeffery	A. E. Beason
Augusta, Me.	Maxwell	T. C. Buckley
Avoca, Ia.	Studebaker	Derby Auto Co.
Avon, N. Y.	Maxwell	H. W. Spencer
Bamberg, S. C.	Maxwell	G. D. Ryan
Bar Harbor, Me.	Franklin	Fred L. Savage
Battle Creek, Mich.	Maxwell	American Motor Co.
Baxter, Ia.	Hupmobile	Noah & McCullough
Beardsley, Minn.	Maxwell	R. Herbers
Belleville, Ill.	National	John Penn
Bemidji, Minn.	Kisselkar	Northern Auto Co.
Bemidji, Minn.	Reo	C. M. Jewett
Benkelman, Nebr.	Oakland	E. A. Mathews
Blackfoot, Ia.	Maxwell	J. H. Ashton
Blackton, Ia.	Oakland	F. E. Thomas
Bloomfield, Nebr.	Hupmobile	J. B. Cossard & Co
Boone, Ia.	Maxwell	Jons Auto Co.
Borden, Ind.	Maxwell	Borden Motor Co.
Boston, Mass.	Oldsmobile	L. N. Wheelock
Boston, Mass.	Simplex	George Canterbury
Brainerd, Minn.	Kisselkar	Hoffman & Bane
Brainerd, Minn.	Maxwell	Rosko Bros.
Brandon, Tex.	Maxwell	D. J. R. Youngblood
Breckenr'ge, Minn.	Kisselkar	Interstate Garage Co.
Bridgeport, Ill.	Hupmobile	S. B. Postlethwaite
Brinsmade, N. D.	Maxwell	Alex Link
Bristol, Tenn.	Maxwell	Davis-Sparger Auto Co.
Brockton, Mass.	Maxwell	Frank E. Cedergren
Brooklyn, N. Y.	Chandler	F. H. Cronebach
Bruceton Mills, W. Va.	Maxwell	G. W. Bice
Buckley, Ill.	Hupmobile	O. P. Brooke
Burlington, Ia.	Westcott	Cable Motor Car Co.
Burton, Kans.	Oakland	Beckham & Mead
Calamus, Ia.	Kisselkar	J. Hayes, Jr.
Calgary, Alb.	Haynes	H. T. Sheffield
Callaway, Nebr.	Maxwell	D. F. Sherrick
Cambria, Ia.	Maxwell	W. H. Davis
Camden, S. C.	Hupmobile	W. R. Eve, Jr.
Cameron, Tex.	Hupmobile	J. H. Gandy
Canal Fulton, O.	Maxwell	Keller M. C. Co.
Canby, Minn.	Hupmobile	James Moravetz
Canton, O.	Westcott	Standard Motor Car Co.
Cantril, Ia.	Maxwell	J. F. Harbidge
Cape Girardeau, Mo.	Hupmobile	Hunter Bros.
Carlton, Ga.	Maxwell	F. D. Smith
Carrington, N. D.	Maxwell	Foster County Implement Co.
Carroll, Ia.	Jeffery	Swaney Auto Co.
Center Junc., Ia.	Hupmobile	M. G. Alsever
Centerville, S. D.	Hupmobile	Centerville Hdwe. Co.
Chadbourn, N. C.	Maxwell	Chadbourn Auto Co.
Chadwick, Ill.	Kisselkar	Chadwick Auto Co.
Charabaneau, N.D.	Hupmobile	Feo & Meyer
Chariton, Ia.	Maxwell	Miley Bros.
Charleston, S. C.	Chandler	Charleston Motor Sales Co.
Chester, Ill.	Metz	Herschbach Bros.
Circleville, O.	Pilot	Joseph Metzger
Clarion, Pa.	Chandler	Central Garage
Clarksburg, W.Va.	Hupmobile	F. A. Willison
Cleveland, O.	Havers	Crotty Co.
Cleveland, O.	Regal	Crotty Co.
Collinsville, Ill.	Velie	W. E. Jokerst
Columbia, Mo.	Metz	J. N. Taylor
Columbus, Miss.	Maxwell	Eszell & Waters Bros.
Columbus, O.	Herff-Brooks.	Columbus Auto Sales Co.
Columbus, O.	Westcott	Brasher Motor Car Co.
Concord, Nebr.	Maxwell	A. G. Carlson
Conemaugh, Pa.	Oakland	S. S. Mack
Conway, Ark.	Maxwell	Hendrickson & Martin
Coopertown, N. D.	Maxwell	Hammer-Condy Co.
Cornopolis, Pa.	Oakland	A. R. McCutcheon
Cornelia, Ga.	Maxwell	L. B. Hill
Corning, N. Y.	Maxwell	M. L. Allen
Cozad, Nebr.	Maxwell	Cozad Hardware Co.
Craig, Nebr.	Auburn	Dave Thurber
Crandon, Wis.	Franklin	Page Mercantile Co.
Crawf'dsville, Ind.	Maxwell	Guilliams & Van Ausdall
Cresco, Ia.	Allen	Fred M. Pierce
Cresco, Ia.	Maxwell	Ohmacht Auto Co.
Creston, Ia.	Maxwell	J. F. Russell & Sons
Crookston, Minn.	Maxwell	N. P. Stone & Co.
Cullman, Ala.	Maxwell	A. H. Reinhardt
Dalton, Minn.	Maxwell	Dalton Trade Co.
Dassel, Minn.	Maxwell	Dassel Motor Co.
Dayton, O.	Pilot	G. S. Staub
Defiance, O.	Hupmobile	Clint Colwell
Deming, N. M.	Oakland	New Mexico Implement Co.
Des Moines, Ia.	Hupmobile	E. A. Paul
Des Moines, Ia.	Westcott	Independent Automobile Co.
Detroit, Minn.	Kisselkar	Frazee Bros.
DeWitt, Ia.	Kisselkar	Irwin & Homer
Dexter, Ia.	Maxwell	G. W. Marston
Dixon, Nebr.	Hupmobile	F. J. Hooker
Dixon Spg., Tenn.	Maxwell	Gregory & Morton
Dublin, Tex.	Hupmobile	N. J. Keith
Dubuque, Ia.	Maxwell	Kassler Auto Co.
Durham, N. C.	Maxwell	Durham M. Sales Co.
Eagle Lake, Minn.	Maxwell	D. D. Cummins
Eastman, Ga.	Maxwell	Burch Bros.
Edgeley, N. D.	Maxwell	Pepper & Canow
Elk Point, S. D.	Hupmobile	Main & Fickey
Ellston, Ia.	Maxwell	E. B. Fouser
Elsmore, Kans.	Maxwell	Krokstrom Bros.
Emporia, Kans.	Maxwell	J. C. Burkett
Eufaula, Ala.	Maxwell	H. C. Holleman
Fairchild, Wis.	Mason	Butterfield Motor Car Co.
Fairchild, Wis.	Maxwell	Butterfield Motor Car Co.
Fairchild, Wis.	Kissel	Butterfield Motor Car Co.
Fairfax, Mo.	Maxwell	Atchison Co. Motor Co.
Fairport, N. Y.	Maxwell	G. W. Brown & Sons
Falmouth, Mass.	Franklin	Crocker Garage
Farmington, Mo.	Oakland	Walter L. Morris
Fenton, Mo.	Moon	J. F. Rudder
Fergus Falls, Minn.	Maxwell	Fergus Auto Co.
Flemington, N. J.	Maxwell	John G. Lawshe
Florence, S. C.	Hupmobile	C. R. Smith
Florence, Wis.	Hupmobile	H. R. Seidel
Fontanelle, Ia.	Maxwell	W. E. Morley
Fort Dodge, Ia.	Westcott	Knight Motors Co.
Franklinton, N. C.	Maxwell	Franklinton Garage Co.
Freeman, S. D.	Oakland	Farmers' Co-Op Society
Fr. Camps, Miss.	Hupmobile	J. W. Howell
Fulton, Ill.	Kisselkar	Sikkema & Brunins
Garden Grove, Ia.	Maxwell	Roberts & Herweh
Gardner, Ill.	Maxwell	Wagner & Root
Glasgow, Mont.	Maxwell	S. J. Rundle
Geddes, S. D.	Hupmobile	W. H. Fowler
Gr. Rapids, Mich.	Franklin	John Vlasblom
Gr. Island, Nebr.	Oakland	Mat Jarvis Auto Co.
Grand Mound, Ia.	Kisselkar	G. Ahlff & Son Co.
Granville, Ia.	Hupmobile	John List
Granite City, Ill.	National	F. E. Tully
Grantsburg, Wis.	Maxwell	S. E. Jensen
Greenville, Ill.	Maxwell	Edgar Ragland
Guadalupe, Cal.	Hupmobile	M. D. Martin
Genoa, Nebr.	Oakland	Munson & Son
Hankinson, N. D.	Maxwell	Fred Worner
Hannibal, Mo.	National	J. F. Meyer
Harrisburg, Ia.	Hupmobile	T. C. Dempewolf
Harrison, Ont.	Maxwell	Downey & McPhail
Hartford, Conn.	Chandler	E. S. Clark
Hartley, Ia.	Hupmobile	J. C. Bradstreet
Hecla, S. D.	Hupmobile	A. G. Street
Helena, Ga.	Maxwell	H. F. Thaxton
Hemersville, O.	Hupmobile	H. N. Sannah
Henderson, N. C.	Maxwell	J. S. Poythress & Son
Highland Pk., Ill.	Kisselkar	North Shore Auto & Transportation Co.
Highpoint, N. C.	Haynes	Peoples M. C. Co.
Hilger, Mont.	Maxwell	W. A. Dodder
Hillsboro, Tex.	Hupmobile	T. L. Newton
Hollensburg, Ind.	Pilot	Geo. Wolf
Hominy, Okla.	Maxwell	R. D. Reed
Hope, Minn.	Hupmobile	Slezak Bros.
Houston, Tex.	Maxwell	Smith & Lindsay
Huntington Park, Cal.	Hupmobile	A. P. Hultquist
Huntington, W. Va.	Franklin	W. B. Martin
Huron, O.	Hupmobile	G. E. Rhinemiller
Huron, O.	Chalmers	G. E. Rhinemiller
Huron, O.	Ford	G. E. Rhinemiller
Huron, S. D.	Kisselkar	E. I. Bowe
Idaho Falls, Id.	Maxwell	Dowd-Bucklin Auto & Sup. Co.
Indianapolis, Ind.	Inter-State	Interstate Automobile Co.
Iona, Minn.	Maxwell	Iona Auto Co.
Irene, S. D.	Hupmobile	Johnson Bros.
Iron River, Mich.	Hupmobile	Thorin & Singler
Ironton, O.	Hupmobile	A. H. Washburn
Ishpeming, Mich.	Pilot	P. P. Chase
Jamaica, Ia.	Maxwell	G. W. Heater
Jamestown, N. D.	Maxwell	J. A. Anderson Motor Co.
Jackson, O.	Hupmobile	Geo. F. Beiser
Jackson, Minn.	Maxwell	Jackson Auto & Imp. Co.
Jonesboro, Ark.	Maxwell	W. M. Jackson
Kemp, Tex.	Maxwell	M. L. Haynie
Kent, O.	Chandler	Getz Bros.
Keokuk, Ia.	Kisselkar	W. W. Perdew
Kiefer, Okla.	Maxwell	J. H. Anderson
Kirwin, Kans.	Maxwell	Cogswell Motor Co.
Kingsley, Ia.	Hupmobile	Tom Sheaffer
Kokomo, Ind.	Chandler	Smith Auto Sales Co.
La Grange, Ky.	Hupmobile	Yager Bros.
La Grange, Ky.	Paige	J. L. Kaplinger
Lamar, Mo.	Maxwell	Pacific Gar.
Lamont, Ia.	Maxwell	F. Retz & Son
Lanark, Ill.	Kisselkar	W. H. Puterbaugh
Lansing, Ia.	Maxwell	Gilbertson & Lenz
Laurel, Miss.	Maxwell	Ed. Landrum
Laurel, Mont.	Hupmobile	Stripp & DeGarmo
Lebanon Junc., Ky.	Paige	Ray & Hocker
Lewiston, Me.	Kisselkar	Hall & Knight
Lexington, Ky.	Lozier	Harrison Scott
Lexington, Nebr.	Hupmobile	F. H. Jacobson
Lignite, N. D.	Maxwell	Jacobson & Banister
Lime Springs, Ia.	Hupmobile	John J. Williams
Lincoln, Cal.	Maxwell	Lincoln Gar.
Lincoln, Nebr.	Lewis	Lincoln Auto Co.
Lincoln, Nebr.	Ohio	Lincoln Auto Co.
Lisbon, O.	Maxwell	L. B. Pike & Son
Littleton, N. C.	Hupmobile	W. G. Coppersmith
Little Falls, Minn.	Hupmobile	Dr. J. H. Newman
Little Rock, Ark.	Chandler	Tedford Auto Co.
Little Rock, Ia.	Hupmobile	Bromley & Meyers
Lock Mills, Me.	Kisselkar	E. L. Tebbets Co.
Long Pine, Nebr.	Hupmobile	Ed. Engle
Los Angeles, Cal.	Chandler	Chandler M. C. Co.
Low Moor, Ia.	Kisselkar	Dannett Bros.
Luther, Mich.	Maxwell	Cutler Bros.
Lucas, Kans.	Maxwell	G. G. Hadlock
Lynch, Nebr.	Hupmobile	Ira & Feidler
Lynn, Mass.	Maxwell	J. R. Honors
Macon, Ga.	Chandler	Steinhauer & Wight
Malvern, Ia.	Studebaker	Salyers & Kayton
Manchester, Ia.	Maxwell	A. M. Cloud
Marianna, Ark.	Maxwell	C. T. Chandler
Marietta, O.	Detroiter	F. G. Henry
Marion, Mich.	Maxwell	Joseph Lowry
Mark Center, O.	Maxwell	D. E. Swaysgood
Markesan, Wis.	Maxwell	Chas. F. Schraeder
Martinsburg, Mo.	Maxwell	H. F. Hofterman & Co.
Marysville, O.	Oakland	H. I. Huffman
Maskell, Nebr.	Hupmobile	A. B. Westberg
Mason City, Ia.	Maxwell	Barney & Harding
Massbach, Ill.	Maxwell	Rudolph Dittmar
Mayville, Wis.	Maxwell	Badger Auto Co.
McGregor, Tex.	Hupmobile	O. D. Slaughter
Mebane, N. C.	Maxwell	Mebane Motor Co.
Mechanicsburg, O.	Hupmobile	Stuart & Co.
Menno, S. D.	Hupmobile	E. J. Decker
Merrill, Ia.	Hupmobile	C. C. Hauff
Middletown, Md.	Maxwell	Model Gar.
Miles City, Mont.	Kisselkar	Myers & Lindeberg
Millidgeville, Ill.	Kisselkar	Chas. S. Woodin
Minneapolis, Minn.	Maxwell	B. & B. Auto Co.
Minneapolis, Minn.	Lewis	Alex R. Curtis
Minneapolis, Minn.	R-C-H	Haynes Motor Car Co.
Minneapolis, Minn.	Crow-Elkhart	Alex R. Curtis
Minneapolis, Minn.	Mercer	James H. Ward
Mindenmines, Mo.	Maxwell	Briggs Hdw. & Imp. Co.
Millard, Nebr.	Studebaker	Peters Bros.
Moberly, Mo.	Auburn	O. Ratzer
Mobile, Ala.	Chandler	Ashland M. C. Co.
Mondamin, Ia.	Hupmobile	G. W. Coffman
Monroe, Ga.	Maxwell	Breedlove Hdw. Co.
Monticello, Ill.	Stearns	D. M. Moore
Montpelier, Vt.	Kisselkar	Lane Mfg. Co.
Montevideo, Minn.	Maxwell	C. J. Anderson
Mt. Vernon, Ga.	Maxwell	McRae & Hicks
Mt. Carroll, Ill.	Kisselkar	W. W. Hartman
Monticello, Ga.	Hupmobile	Dr. F. S. Belcher
Mooresville, N. C.	Maxwell	McNeely & Smith
Morrison, Ill.	Kisselkar	O. Woods
Morely, Mo.	Hupmobile	Reis Mason
Mulkeytown, Ill.	Hupmobile	E. K. Ekins
Nashua, N. Y.	Chandler	Chandler M. C. Co. of Nashua
Neche, N. D.	Hupmobile	Eid & McLachlan
Nehawka, Nebr.	Hudson	V. P. Sheldon
Neligh, Nebr.	Oakland	Clyde Foreman
Nemaha, Nebr.	Oakland	W. W. Seid & Son.
Nevada, Ia.	Maxwell	B. F. Bell & Co.
Nevada, Mo.	Maxwell	B. F Fowler
New Brunswick, N. J.	Chandler	Perth Amboy Garage
Newburgh, N. Y.	Chandler	Broadway Garage
New Market, Ia.	Maxwell	W. J. Parsons
Newark, N. Y.	Chandler	Fainsworth & Welcher
Newark, O.	Abbott	W. B. Wingerter
Newark, O.	Detroiter	Norris & Sigler
Newark, O.	Maxwell	S. E. Forsythe
Newark, O.	White	Emmet Baugher
New Albany, Ind.	Metz	Ervin F. Bence
New Haven, Conn.	Chandler	Knowles & Rudolh
New Haven, Mo.	Hupmobile	Smith & Helm
New Milford, N. Y.	Hupmobile	S. R. Drow & Son
New York, N. Y.	Ohio	Gotham Motor Car Co.
Nome, N. D.	Maxwell	Nome Hardware Co.
Nordheim, Tex.	Pilot	W. V. Raab
Norfolk, Nebr.	Oakland	C. C. Stahl
North Benning-ton, Vt.	Maxwell	W. M. Marshall
North Clymer, N.Y.	Hupmobile	W. H. Newell
No. Vernon, Ind.	Pilot	Litchfield Bros.
Norristown, Pa.	Carnation	Norris City Garage
Norwich, Kans.	Maxwell	Norwich Motor Co.
Novinger, Mo.	Maxwell	Kriner & Hughes
Ogdensburg, N. Y.	Franklin	A. E. Cline & Son
Oneonto, N. Y.	Chandler	Arthur M. Butts
Orangeburg, S. C.	Maxwell	Edisto Auto & Machinery Co.
Oregon, Mo.	Maxwell	Auto Sales Co.
Orrville, O.	Maxwell	Keller Motor Car Co.
Oswego, N. Y.	Maxwell	Steam Carriage Boiler Co.
Ottawa, Ill.	Maxwell	E. N. Hegland
Ottawa, Ont.	Hupmobile	Austin G. Gowan
Owaneco, Ill.	Hupmobile	Tex Bros.
Osage, Ia.	Maxwell	York Covey
Palmyra, Wis.	Maxwell	S. P. Nostrom
Paris, Mo.	Maxwell	C. F. Pelsue & Son
Parker, S. D.	Hupmobile	H. M. Danforth
Patchogue, L. I.	Kisselkar	Bellman Auto Co.
Peekskill, N. Y.	Chandler	Lawsons Garage
Peekskill, N. Y.	Hupmobile	W. H. Ash
Pekin, N. D.	Maxwell	Gulbro & Loe
Pender, Nebr.	Oakland	John Albertson
Penn Yann, N. Y.	Chandler	M. J. Gavin
Peoria, Ill.	Westcott	George J. Smith
Philadelphia, Pa.	Empire	Ralph D. Earle

HESS-BRIGHT Bearings for Shafting—The Hess-Bright Mfg. Co., Philadelphia, Pa., maker of ball bearings, has brought out a full line of ball bearings, mounted in suitable brackets, for the carrying of line shafting. Ceiling hangers, post hangers, and pillow blocks, Fig. 1, are made in all sizes.

A feature of the ball bearing hanger is the adjusting screws which are arranged at an angle. These press against feet located on the yoke located below the body of the bearing box, and hence any chance of distortion of the box and the bearing due to excessive set-screw pressure is eliminated. The box has a spherically shaped body which is held in a spherically shaped yoke allowing a perfect universal swiveling action. Oiling is required only once or twice a year. The consumption of power is from one-tenth to one-twentieth what it is with plain bearings. It is said that less space is required and there is no possibility of hot boxes.

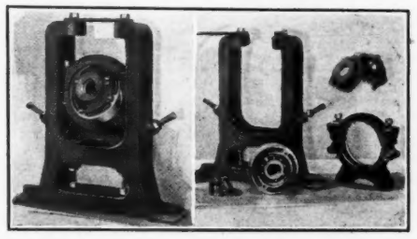


Fig. 1—Hess-Bright ball bearing pillow block

Stewart Cyclecar Speedometer—The Stewart-Warner Speedometer Corporation, Chicago, Ill., has just added a cyclecar speedometer, Fig. 2, to its Stewart line. This speedometer is to sell for $15 and will indicate speed up to 80 miles per hour. The season odometer registers 10,000 miles while the trip registers 100 miles and then repeats. The price includes all connections.

Fig. 2—Stewart cyclecar speedometer

Private Garage Bench—With the idea of saving the car owner who keeps his machine in his own garage much of the expense of small repairs the Grand Rapids Hand Screw Co., Grand Rapids, Mich., has brought out a garage bench, Fig. 3, specially adapted to needs of average automobile repair work. It is intended for the private garage so that the owner can do the work. It is substantially constructed of wood and has two drawers partitioned off for bolts, screws and sundry articles. It occupies little room in the garage, measuring 48 inches in length, 24 inches in width and being 36 inches high. A galvanized iron top is laid over the hardwood top, while part of the equipment is a continuous screw iron vise. On one end is fastened a wire basket to receive rags and sponges, making the bench handy for tire repairs as well as other jobs. To further aid in tire repairing there is an extension slide for vulcanizing work. The bottom of the bench is fitted with a three-ply panel and back rail for the keeping of oil cans and the like. The price is $15.

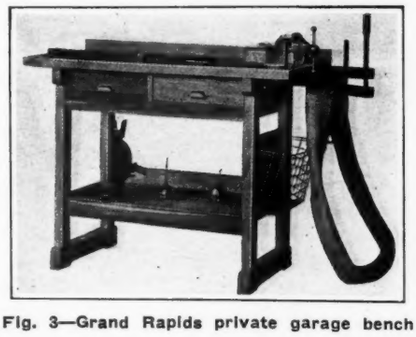


Fig. 3—Grand Rapids private garage bench

Pedersen United Terminals—To keep the timer terminals on Ford cars out of the way of dirt and oil, the Pedersen Lubricator Co., New York City, has brought out a set of terminals that allows all the timer wires to be attached at the top of the casing, thus preventing them from the possibility of becoming oil soaked with consequent short-circuiting and also it prevents the twisting and straining of the connections.

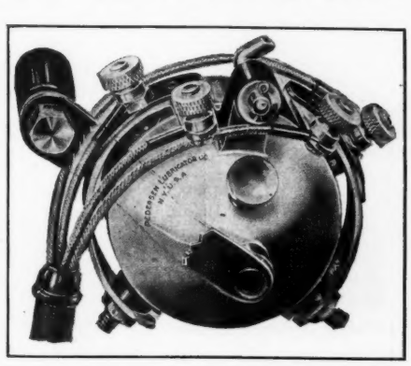


Fig. 4—Pedersen United Terminals

The terminals, Fig. 4, are simple and easily applied. Remove all the knurled nuts and the hexagon nuts on the two upper connectors. Loosen the nuts on the lower connectors and insert the slotted end of the terminals under these nuts, passing the upper connector through the hole into the fiber plate. Replace the nuts and screw them up tight. Put on the knurled nuts again, using two of them for the terminals. The price, postpaid, is 50 cents.

The Pedersen company makes many other Ford specialties, including a lubricator, a gasoline shut-off valve, known as the Handy gasoline turn-off, and the Stay-on belt holder.

Apco Ford Lighting Outfit—The John V. Wilson Co., 220 Pleasant street, Boston, Mass., is manufacturing a lighting outfit especially for Ford cars. It consists of two reflectors, connections and switch, and sells for $3.50. The reflectors are 8 or 9 inches in diameter and are equipped with tungsten bulbs and Ediswan sockets. No special work is necessary for its installation.

Rad-Fix—The radiator sealing compound which was described in THE AUTOMOBILE for February 26, page 529, has an action on the metal of the radiator which is somewhat different from what may be gathered from this description. In order to explain the action it must be stated that the solution is not a glue or a cement and therefore has no clogging action either in the radiator screen nor in the cells of a honeycomb type.

In repairing a leak it will be noted that a sort of weld results. This weld is indicated by a metallic crust forming over the leak and is explained by the makers as a form of corrosion and crystallization of the metals after the substance has passed through the leak and become exposed to the air. It is not a crystallization of the liquid. In order to understand this action clearly it must be understood that the substance which covers the leak is a metallic one as distinguished from the animal or vegetable matter in the film that would be deposited by such substances as fish glue or rosin.

Rad-Fix comes in gallon cans and it requires the whole amount to seal a leak. It is poured in the radiator when the car is laid up at night and in the morning the radiator can be filled with water and the car used in the regular manner. It must

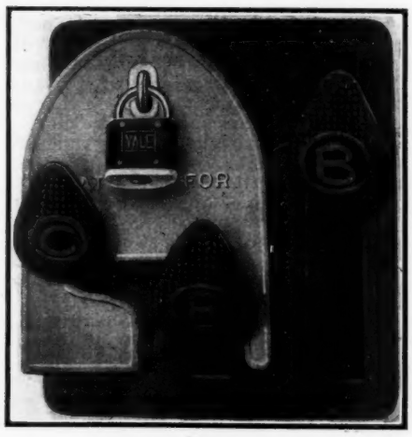


Fig. 5—Ford pedal lock

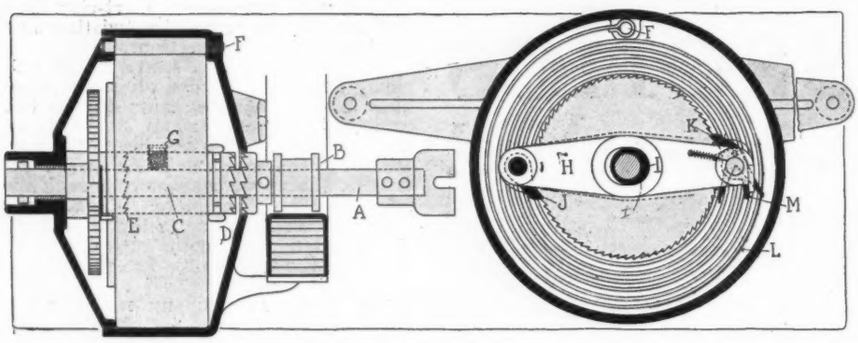


Fig. 6—Teeves-Green spring starter applied to Ford car, part section at left, front view with cover removed at right

be understood that this substance, from the nature of it, can only be used on small leaks. It has the advantageous physical quality of boiling at 260 degrees Fahrenheit or 48 degrees above water which renders its use of some advantage in hot weather as it reduces to some extent the chances of overheating.

Teves-Green Starter—A new spring starter that is very simple in its construction is about to be placed on the market at a surprisingly low price by Messrs. Teves & Green, 250 West Fifty-fourth street. Its installation on a Ford car is shown in Fig. 6, although it is planned to make this device for all machines.

The spring is automatically wound by the motor in about 30 seconds. To start the engine a button is pressed, which releases the spring, transmitting power to the motor and turning it a dozen or more times at a speed of 300 revolutions per minute.

Referring to the figure it will be noted that the starter is attached to the Ford just in front of the radiator, the tube A taking the place of the starting crank. It fits into the bushing B, which is designed to hold the starting crank. When the motor is to be cranked the sleeve C, which can slide on a rod that runs out to the front to the new position of the handle, is moved to the right so that the dog clutch members D engage. At the same time the dog clutch members E are disengaged, releasing the spring. The teeth of these two clutches overlap so that E is not disengaged until D is engaged, therefore the instant the latter is brought into action the motor starts to rotate. At the same time the overlapping prevents any slippage. The movement of this sleeve is accomplished through a collar.

When it is necessary to turn the motor over by hand, as when testing the compression or grinding the valves, this may be done in the usual manner by using the starting crank fitted at the other end of shaft A. This shaft is one piece of tubing running right to the crankshaft end. When the motor is cranked by hand none of the starter parts are operated.

The winding of the spring is accomplished in an ingenious and simple manner. It is done by means of the ratchet mechanism shown at the right. The spring is attached to the casing at F and is bolted to the sliding sleeve at G.

When the spring is run down it is wound up by the oscillation of the arm H, actuated by the eccentric I, which is attached to the shaft A. The movement of this arm winds up the ratchet gear through the operation of the ratchets J and K.

When the spring is wound the ratchet mechanism is thrown out by the inward movement of the steel band L riveted to the spring. This band bears down on a projection on the other end M of the ratchet K. The two arms N limit the movement of this band.

The starter is 9.5 inches in diameter and 8 inches in length and weighs about 25 pounds. It is especially adapted to Fords and cyclecars and can be attached in about 30 minutes, it is said.

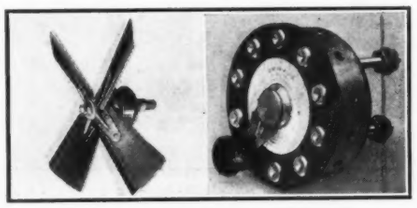


Fig. 7—Left—Oakes cyclecar fan
Fig. 8—Right—Servus headlight controller

Oakes Cyclecar Fan—A new model fan, Fig. 7, designed especially for cyclecar use, has been put out by the Oakes Fan Co., Indianapolis, Ind. It is featured by lightness and the special construction employed gives greater efficiency than has been obtained before, it is claimed. The blades are set at the angle that has been found most effective in practice.

Servus Electric Headlight Controller—The electric headlights may be completely controlled; brightened, dimmed or extinguished by the use of the Servus Headlight Controller, Fig. 8. It is a combined switch and rheostat, the latter consisting of specially drawn resistance wire, which is divided into ten sections with contact points so arranged as to allow all, any part or none of it to be brought into circuit. When the lever is placed in the low point the light will burn very dim. As it is moved to the other points it will cause them to become brighter and when it reaches the high point it allows the entire potential supplied to go to the lights.

The controller is guaranteed for life. No special wiring is required to install it. The price is $5. It is manufactured by the Servus Rescue Equipment Co., Newark, N. J., and is sold by the Federal Equipment Co., the same city.

Roller Bearing Accelerator Pedal—To enable the driver to operate the accelerator pedal smoothly and not by jerks, the Roller Bearing Foot Pedal Co., St. Paul, Minn., has introduced the device shown in Fig. 9. In place of the pad for the foot which is found on the ordinary pedal, two rollers are substituted. It lists at $3.50.

Konigslow Cyclecar Clutches and Universals—Clutches and universal joints designed especially for cyclecars are manufactured by the Otto Konigslow Mfg. Co., Cleveland, O. A clutch is shown in Fig. 10 and a universal in Fig. 11.

The clutch is featured by a very light pressed-steel spider and simplicity of construction. It is leather faced and ball thrust bearings are used back of the clutch spring.

The universal joint construction is clearly illustrated, the pin of the joint being clamped into the block A. This block is slotted and the pins are held by the screws B. The bearing surfaces are fitted with removable bushings.

A feature of the joint is the ease with which it can be taken apart. By loosening two of the screws in the center block A the pins can be removed and the joint taken apart. These joints are provided with oil and dustproof metal covers.

Rajah Assorted Terminals—The Rajah Auto Supply Co., Bloomfield, N. J., has put on the market a box of assorted terminals designed for the garage trade, dealers and repair shops. The box contains 98 clip and 20 primary terminals and are made from the highest quality spring brass and provide an efficient, dependable connection, it is said.

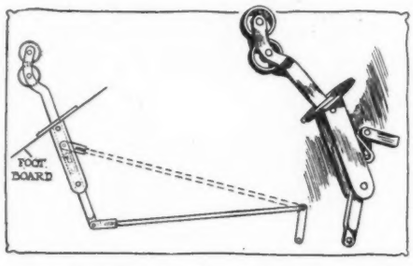


Fig. 9—Roller bearing accelerator pedal

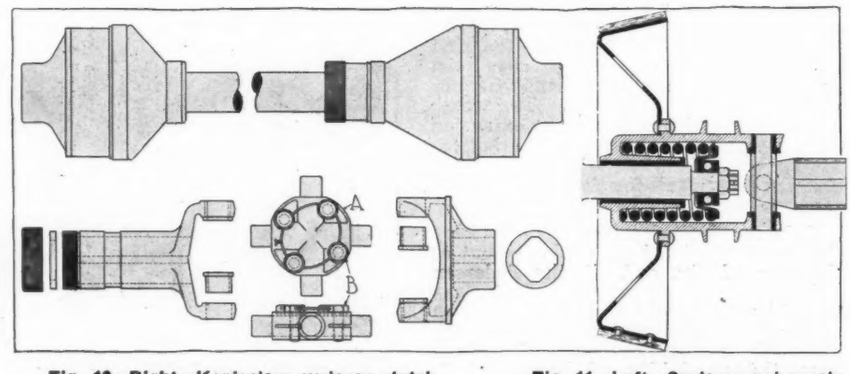


Fig. 10—Right—Konigslow cyclecar clutch.

Fig. 11—Left—Cyclecar universals